Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Appendix 16 to Deadline 5 Submission:

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
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Revision A	Original document submitted to the Examining Authority

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Response to LPC Deadline 4C Submission

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1 Stakeholder Representations

Ref#	LPC Rep	Applicant Response
1.2	The LPC are particularly disappointed that the data previously supplied by the LPC on vessel turning distances, stopping distances and bridge visibility from a variety of different vessel types which support our claim for a 2 mile operational sea room with a 1 mile safety exclusion zone to the North East of the existing Pilot Diamond, has been ignored.	In determining the SEZ, the applicant has welcomed the input from LPC and placed strong weighting on what has been provided, specifically data and interpretation on agreed guidance from MGN543 and MSP as provided by LPC in contributing towards determination of sea room. The guidance (MGN and MSP) has been applied and the Applicant's proposed SEZ meets these criteria and provides such necessary sea room. In addition the 2nm plus 1nm as stated in the LPC submission here (noting that 1nm buffer has not previously been put forward by LPC) is provided for in the SEZ in the vicinity of NE Spit PBS and indeed to the immediate NE in area of highest concentration of existing transfers (where the 2nm plus 1nm is exceed with a total available distance of 3.4nm). The residual area of disagreement with LPC, and as confirmed during ISH8, is therefore understood to be regarding the 0.5nm buffer at NESP Buoy to which the following is noted by the Applicant: Evidence does not indicate a large number of transfers in this area. At 'north east of the diamond' and, in relation to ESL submissions (Reference Table 5 of Appendix 1 to Deadline 4B submission – NRA Addendum) that only 4.8% and 3.5% of transfers are stated to take place in the areas (as represented by Tongue Pilot Diamond and NE Buoy). It is therefore an area dominated by transiting traffic. Furthermore, the MSP basis has been applied in the 'narrowest' point between NESP Buoy and wind farm and in a precautionary manner by allowing sufficient sea room for 4x overtaking vessels of 333m LOA (1.53nm) plus 0.97nm buffer. Notwithstanding this relates to sea room for transiting traffic, in any case, this also exceeds the sea room required by the same guidance to turn a vessel.

		The MSP establishes the need for the assessment to be site specific and based on specific local considerations and so, notwithstanding that a circa 1nm buffer has been provided in accordance with guidance as described above, we note that vessels navigating around the current TOW do so up to 0.5nm from the WTG – which can therefore be considered a safe sea room buffer which is appropriate, site specific, reflective of current mariner practices transiting the site and appropriate to the site and specific local considerations. Within the approaches to the Thames Estuary it is noted that the London Array (as referenced by LPC) is 0.5nm from the deep draught (large vessel) channel to the Port of London.
1.3	At a recent meeting of the LPC where the content of this submission was discussed it was estimated that between the 6 members present we had over 3,000 boarding and landings at the NESP which have been conducted in all conditions of weather, tide and traffic density on all classes and types of vessel. With this experience we are confident that our opinion on the sea room and SEZ required is based upon solid professional experience.	The Applicant would request: Details on whether any/all of the 4 PLA Pilots participating in the bridge navigation simulations are members of LPC, and their involvement in representations to date by LPC? Whether any/all the 4 PLA Pilots participating in the simulations were represented within the body of 6 members at the stated meeting? Whether any/all the 4 PLA Pilots were able to provide any commentary or input to the SEZ based on the conclusions reached in the debrief washup and issued report for the navigation simulations (or indeed on the limitations of the simulation exercise and the PLA simulator that has emerged from LPC during Examination).
1.4	With the benefit of this experience the LPC are adamant that the proposed 0.5 mile SEZ of the revised red line boundary	With regards to pilot transfers at NESP, the Applicant has provided the sea room requested by LPC (and PLA / ESL) at Deadline 3 of 2nm, plus a

	leaves insufficient sea room and safety margin for manoeuvring large vessels at the NESP during Pilot operations. Furthermore the loss of sea room and proposed 0.5 mile SEZ significantly increase the risk of close quarters situations between vessels, allows negligible room for emergency contingencies and represents an increased risk to the personal safety of the Pilots and Mariners alike.	1nm buffer (as requested by PLA), in the area of NESP used for general operations and pilot operations. This exceeds the sea room as per the navigation simulation (noting the project area in which structures may be constructed has reduced twice since the simulations were undertaken), the manoeuvring distances derived from MSP and MGN543 guidance, and also the distances put forward by PLA.
1.5	In this submission we will supplement the data previously supplied on vessel manoeuvring characteristics with photo shots from X band and S band radars from vessel which were deliberately navigated close to the Windfarm to demonstrate the safety of navigation concerns, the dramatic changes to the line of sight for vessels making for the diamond and the increase in manouvering sea room required at the Pilot diamond, all of which the revised red line boundary creates. We	The Applicant refers to other areas of this document for more detailed commentary on radar and line of sight aspects raised by LPC – specifically Sections 2.1, 2.2, 2.3, 3.1, 3.2, 3.8, 4.1, 4.3 and 4.4.

	suggest that following will support entirely our requirement for a 1 mile SEZ for manoeuvring large vessels to the NE of the existing Pilot diamond instead of the 0.5mil proposed by the applicant. activities, including maintenance, would still be permitted and the PLA and ESL would welcome the opportunity to clarify this with the Applicant.	
1.6	In this submission the LPC offer a 'trade off' in SEZ. The inshore area to the SE of the current Pilot Diamond, at the Elbow Buoy, has fewer Pilot transfer operations than the area immediately at the Pilot Diamond. Many of the vessels transiting through this area at the Elbow Buoy are smaller Class 3 and Class 4 vessels and go on to transit over the NESP bank. These vessels have lesser manoeuvring and sea room requirements. In this area we would agree a 1.5 mile sea room with a 0.5 mile SEZ as shown on the applicants revised red line boundary plan. However, it is imperative that the 2 miles	The Applicant recognises and welcomes agreement in the area of Elbow – where sea room has been agreed and justified on the evidential basis of limited number of transfers as evidenced by analysis of distribution of pilotage density (Ref: Fig 6 of Appendix 14 to Deadline 4) and the submission by LPC (Ref Fig 14, 15 and Table 5 of Appendix 1 to Deadline 4B) showing that 2.1% and 0.7% of transfers take place at Elbow in 2017 and 2018). The Applicant also agrees that Class 3 & 4 vessels transit here although would note that a significant number of Class 1 and 2 vessels also navigate through this gate (and hence the Applicant has allowed for 4 x 333m LOA vessels navigating in this area (1.53nm sea room) with a 0.5nm buffer). The evidence demonstrates that most vessels of Class 2 and above navigate over the NESP bank (and suggests that vessels of >10.1nm draught navigate to East). It is accepted this is a tidally limiting feature for deep draught vessels and thus vessels may only do this when draught and height of tide allows. However, it is the case that for most vessels most of

	of sea room plus 1 mile SEZ is maintained at the Pilot Diamond and to the North East of the diamond.	the time, the bank itself does not necessarily represent the critical limiting depth for transit to or from their berth. At 'the Pilot Diamond' 2nm + 1nm is maintained (and exceeded). At 'north east of the diamond' the Applicant notes only 4.8% and 3.5% of transfers are stated to take place in the areas (as represented by Tongue Pilot Diamond and NE Buoy) in Table 5 of Appendix 1 to Deadline 4B submission – NRA Addendum).
1.7	The workshops focus has been on traffic data from AIS tracks, Pilot boat data and Incident reports, all of which have been shown in the Applicants NRA but the validity of which has been contested by all IPs. However, all of the above is looking out of the rear view window. There is virtually no consideration given to the immense increase in trade to the Port of London. The PLA business is experiencing continued growth and expected to continue with three new terminals at the London Gateway planned, upgraded tanker terminals at Grays, Vopak, Oikos and of course Tilbury 2 and additional new reefer trades to Tilbury LCT all of which amount to a significant increase in	The MGN543 methodology requires use of the data as used in the navigation risk assessment. The Applicant has applied a justified and conservative forecasted increase (as explained in the original NRA, the addendum NRA and clarified in Appendix 7 to Deadline 5- ExA Action Point 15 from ISH 8) and considered the proportion of vessels navigating inshore and offshore of the wind farm (and the existing physical depth limitations of the inshore area which characterise that) and specifically with regards to traffic associated with the ports and terminals identified by LPC in this comment. The Applicant therefore does not accept the 'yesterdays data' proposition. By way of reference, the PLA's Thames Vision Progress Report dated Oct 2018, that stated Port trade in 2017 was 49.9 million tonnes (+10%, compared to 2015 baseline: 45.3 million tonnes) therefore confirming the LPC stated increase in trade, however when compared to PLA Chargeable Vessel calls, the overall ship arrivals have actually remained static, and indeed decreased between 2014 to 2018. Therefore, with a demonstrable decline in overall ship arrival at London ports since 2003, utilisation of yesterday's data would over estimate ship numbers. The Applicant has provided a clarification of the forecast future traffic profile at other submission of Deadline 5 (Ref: Appendix 7 to Deadline 5- ExA Action Point 15 from ISH 8).

	number of vessels and of increased size of vessel. **We must avoid using yesterday's data to create the safe navigational sea area required for the expanding business of tomorrow.**	
1.8	The tanker berths have all recently undergone upgrades in mooring and cargo handling facilities in order to accommodate larger vessels. Grays Oil Terminal now have two upgraded berths to take 200 x 11.0m tankers, as does Vopak 1. A brand new deep water tanker berth is due to come on line later this year at Oikos 2 for large Afrimax size tankers. All of this additional traffic will pass outbound via the Princes Channel and the NESP to disembark a Pilot.	Notwithstanding the response to Item 1.7, The Applicant notes the conservative 10% future traffic forecast allowance that has been adopted by the Applicant allows for traffic as illustrated in this LPC example. Whilst LPC have identified new/expanding port and terminals in Item 1.7 and the overarching comments on vessel numbers do not consider those berths and terminals on the river Thames that have been disused or have shown a reduced ship arrivals, based on the 33% decline in ship arrivals evident since 2003. With regards to the LPC example of this point, it is noted that this traffic is outbound only (so cannot be assumed to also be inbound) as this draught is the upper end of acceptable draught at NE Spit and these vessels will often be tidally limited and unable to use NESP depending on their draught either inbound or outbound. Whilst these vessels may use the Princes Channel outward bound they will have a Pilot on board and this decreases any risk and improves navigational safety.
1.9	Northfleet Hope Container Terminal (LCT) has seen both a growth in feeder vessel size and	Please refer to Section 1.7 of this submission.

	the addition of new trades such as dedicated reefer vessels.Tilbury 2 has begun building which will accommodate bigger, deeper vessels and the London Gateway is planning a three berth extension. All of which will bring an increase in vessel numbers and vessel size to the NESP.	
1.10	ULCS Container vessels at drafts at or below 10m have been risk assessed for the NESP and 300m Large Container vessels are now frequently boarded and landed at the NESP. An option to dredge the Edinburgh Channel for deeper draft vessels when the LGW berths 4 to 6 come on line will take the pressure off the Sunk Pilot station.	This NRA for 333m LOA vessels has been referred to by LPC at Deadline 1 and Deadline 3 and the Applicant notes the following inconsistencies: Submissions from LPC at Deadline 1 state this risk assessment has limited vessels to 9m draught and at Deadline 3 this was stated between 9.5 and 10m draught. This submission (Deadline 4c) states 10m draught or less. It is not clear to the Applicant (and in the absence of receiving this risk assessment for review) which figure is the appropriate draught figure to be used. Notwithstanding this – it should be noted that a limiting draught does appear to have been applied to these vessels and for occasions when they appear to be in a lighter draught condition (and by way of reference the average (mean) draught for vessels of between 332m and 336m LOA (as transiting to the east of the windfarm in the PLA AIS data as analysed by HRW) is 13.0m). The PLA stated (Deadline 3) *"initial discussions between the PLA/ESL and the LPC have taken place and the question of use by larger vessels is a work in progress".* This was in response to a request by the Applicant to view a copy of this risk assessment (which has not been received to date).

		The Applicant queries the risk assessment relating to these vessels – does this relate to an encompassing risk assessment or is it individually risk assessed and what sort of restrictions/risk controls arise from these scenarios (e.g. threshold metocean limitations specifically relating to wind, tide or wave constraints that may be in place)? Only 1 vessel of this size transited the inshore route in the AIS Seaplanner data sourced by the Applicant (at 11.4m draught – i.e. in excess of the implied maximum draught LPC stated is risk assessed). It is noted that HRW stated at Deadline 4 (in interpretation of POLARIS data) only 3 instances of 330m and 333m LOA vessels using the NE Spit between Dec 2017 and Nov 2018. As stated, to risk assessment for ULCS vessels transiting the inshore route or to/from the NE Spit pilot diamond has been made available to the Applicant to date despite request. Therefore, the Applicant is not clear on the 'endorsed' status of ULCS transits and notes this a recent and limited activity (winter 2017) and in any event cannot be determined as afrequent or normalised activity as an individual risk assessment is seemingly necessary for each transit. The Edinburgh channel deepening is not a proposal that is being progressed in planning terms and as such has no relevance at this time..
1.11	The Sunk Pilot station is often under great pressure when the scheduling of vessel boarding, especially priority boardings of ULCS vessels is carried out in conjunction with Felixstowe traffic. By accommodating increased numbers of large	NESP, Tongue DW and NE Goodwin are all alternative options to SUNK across which boarding operations can be spread/smoothed. It should be noted that that the Tongue DW is designated for usage by 'deep draught' vessels and is therefore suited for use when these ULCS vessels are too deep to board at NESP (which we understand to be a threshold at 9m, 9.5-10m, or 10m draught as stated by LPC variously across Deadline 1, Deadline 3 & Deadline 4) and it is not fully understood why these are being bought into the NESP area at present as opposed to

	vessels at the NESP then pressure is taken off the Sunk for London traffic boardings. Vessel delays and service to our time critical customers such as the London Gateway will be maintained when their new berths become operational.	transfers being undertaken at the Tongue which causes delays/deviation to the vessel itself relative to a transfer at Tongue (or at NE Goodwin when the vessel).
2.1	**Figure 1** clearly shows the view from MSC Athens a 300m container vessel passing 1 mile from the large 220m span turbines. The 1.0 mile shown represents the SEZ as requested by the LPC. During night transit and periods of rain, mist and fog, the Mariner is unable to see through the Windfarm and must rely upon radar alone. AIS targets of small vessels may be obscured in the distorted definition the turbines give on radar and small vessels without AIS will not be detected at all. The 1 mile SEZ allows sea room for collision avoidance, position adjustment if the vessel tracks to the extremity of the intended 2.0 mile sea lane and allows the	A Mariner is able to see through the wind farm at night by keeping an efficient lookout and changing their position where they stand on the bridge. A vessel will still be able to transit 1 mile off the windfarm in the area to the west of the windfarm if this is the desired distance required. A radar needs to be tuned for optimum performance and if this is done then it is possible to detect the movement of vessels within and beyond the wind farm. Notwithstanding the above, the application of the MSP guidance provides for 1.53nm of sea room assuming 4 x vessels of 333m LOA in an overtaking/meeting scenario. Applying this to the distance between NE Spit Racon Buoy and the SEZ leaves 0.97m sea room available as a buffer.

	Mariner valuable time for emergency contingencies.	
2.2	Figure 2 shows the same vessel at 0.6 cables distance off the Windfarm. This is at an even greater distance than the 0.5 miles proposed as an SEZ by the applicants. It is therefore a ridiculous expectation, in our opinion, to propose a lesser SEZ than the 1 mile shown in Fig.1.	Figure 2 is misleading. If the vessel was heading directly towards the wind farm then the narrative on this picture would be correct. However, in real terms the vessel is transiting parallel to the wind farm, so the reference to having to stop or turn is not valid.
2.3	In Fig.2, The Master was extremely concerned operating this close, 0.6 mile from the Windfarm as this vessel takes 0.86 of a mile to turn 90 degrees in the event of anti-collision and 1.4 miles to stop. In other words, in the event of any emergency such as loss of engine power, blackout, steering failure or collision avoidance, especially in fog, then there is insufficient safety margin for any corrective action. All of which are not uncommon incidents.	This is again mis-leading as the vessel had transited through the Knock John Channel at the southern end of the estuary. The Channel here is only 2 cables wide (370m 2/10th nm) so assuming the vessel transited the middle of the channel it will be only 1 cable or 185 metres from danger. The vessel would not be able to alter course to mitigate a collision. Therefore, if this is acceptable, it is not clear why a 0.5 mile from the wind farm causes concern. Even if the vessel did turn through 90 degrees the vessel and was 1 mile off the vessel would then be heading directly into danger so this argument does not make sense

3.1	Figure 3 shows the current line of sight for vessels transiting inbound and outbound from the Pilot boarding diamond passing North of the Windfarm as indicated by the black marker. The line of sight for vessels approaching with the revised red line boundary in place is shown by the blue marker.	The LPC Figure 3 drawing appears inconsistent (please also refer to response to item 5.0 of this document for the Applicants response to Figure 3, Figure 8 and the accompanying commentary from LPC). We note that importantly the figure does not appear to include the Applicants SEZ and therefore the mark-ups and comments on line of sight and radar seem to relate to the RLB and not relate to the Applicants proposed SEZ. The Applicant has provided more detailed commentary, as per the ExA request post ISH in Action Point 9 of Appendix 7 to Deadline 5) noting the absolute differences, as understood by the Applicant between the RLB, the SEZ and the LPC proposal suggested scheme.
3.2	Vessels are unable to 'see' through Windfarms and when using radar alone are unable to determine if risk of collision exists in accordance with the COLREGS Rule 8. Therefore a clear line of sight for the Pilot diamond is essential before altering course towards the Pilot boarding area.	Effects on radar are transitory as the vessel is moving and the Applicant notes that AIS provides additional information source (particularly if enhanced through VHF repeater provision). Whilst a clear line of sight is desirable it is not essential. It should be highlighted that the new wind turbines will be larger but spaced further apart. Therefore, the line of sight visually and by radar would be better than that currently experienced with the various wind farms in the Thames Estuary. This answer is also relevant to item 3.1 above. Furthermore, it would be prudent here to quote the COLREGS. To determine if a risk of collision exists or not then Rule 7 must be used, not Rule 8. Rule 8 deals with the actions to be taken to avoid a collision but first you must use Rule 7 to determine if a risk of collision actually exists. Part A of Rule 7 states that all available means should be used to determine if a risk of collision exists. This includes observing a vessel visually. Part B states that radar should be used to help determine if a

		risk of collision exists and Part C states that assumptions shall not be made on scantily available information especially scanty radar information.
3.3	For a Class 2 and Class 1 vessel (draft greater than 7.5m) approaching the NESP from a position North of the North Thanet Buoy, the existing passage in and out requires a change of course from a heading of 230/245 to 325 degrees after Pilot boarding, passing East and North of the NESP Racon buoy. The 80/90 degree change of heading requires a safe turning circle of approximately 0.5 miles. (See Fig.4 for vessel manoeuvring data)	Vessels up to 7.5 metres draught can safely pass to the west of the NE Spit Racon at all states of tide. As these vessels are restricted by the critical depth for the Princes Channel if it can get up the Princes Channel it can pass west of the NE Spit Racon buoy. Only a very low proportion of vessels using inshore route can only transit east of the NE Spit buoy. The change of course headings in the LPC rep is incorrect. A vessel passing north of the wind farm will in a worst case scenario alter from a heading of 270 degrees round to 230 degrees (a change of 40 degrees) to proceed down to the NE Spit diamond. Once the Pilot is onboard the vessel will need to steer a heading of 010 degrees (a change of 140 degrees) to pass to the east of the NE Spit buoy and then alter heading to 310 degrees (a change of 60 degrees). There is ample sea room in the vicinity of the NE Spit buoy to make this turn.
3.4	Figure 3 clearly shows that the proposed SEZ to the North of the proposed red line boundary pushes the Thanet North Buoy further north into the East/West sea lane. The sea room to the West of the Windfarm has been restricted and the line of sight required by the vessel forces the vessel to make a sharper turn	Reference to a sharper turn is noted but is common in pilotage waters and does not impact on navigational safety – e.g. the turn at the apex to the Longsands Heads is a sharp turn in congested waters which is used by large deep draught vessels.

	down to the South in order to clear the proposed 0.5 mile SEZ in order to approach the diamond for Pilot boarding.	
3.5	The resulting turn after Pilot boarding requires the vessel to make a 120/140 degree turn in order to proceed inbound, passing to the East and North of the NESP Racon Buoy.	This assumes the vessel proceeds all the way down to the NE Spit diamond to board a Pilot which is often not the case. It also assumes the vessel is deep enough draught that it must pass east of the NE Spit buoy which is not always the case too, and is indeed the exception to the majority.
3.6	The searoom required to make this turn is massively increased with revised redline boundary and SEZ. The amount of searoom required to make such a turn varies according to Vessel type. The following data is gathered from actual vessel manoeuvring data in accordance with IMO Res.A601(15)	Please see the Applicants response to Item 3.7
3.7	From Fig. 4 we can clearly see that the amount of sea room to make a 140 degree change in heading required by the proposed red line boundary requires between 0.5 miles for some Class of vessel and by extrapolation, up to **1.2 miles** for the large container vessels.	The Applicant notes the Table Fig 4 is the same as Fig 1 provided by LPC at Deadline 3 and was considered by the Applicant in the SEZ determination in particular with regards to the sea room requirements for vessels stopping and turning. If heading 270 degrees north of the wind farm the alteration of course down to the NE Spit Pilot diamond is a maximum of 70 degrees. The extrapolation used to determine the 0.5 to 1.2nm does not make sense. The LPC have previously stated that for a 333m vessel the turning circle is 1.1nm and requires 1.7nm searoom as per their Deadline 1

		submission. The 1.1nm is correct as per the MGN using the calculation of 6 x vessel length. However in the LPC Deadline 3 submission and the latest deadline 4a submission the same vessel takes 1.45nm to turn just 180 degrees.
3.8	Figure 5 clearly shows the inbound and out bound tracks to the North of the existing Windfarm. Figure 5 also shows the problem the Mariner has in discerning targets for collision avoidance and the loss of definition of radar picture caused by the reflected echo of the turbines.	Radar is not the only tool for collision avoidance and the exception to this is when a vessel is in restricted visibility. A mariner should use the mark one eyeball to look out for other vessels (as mandated by STCW) and determine if a risk of collision exists by taking visual bearings. They can also use AIS to help locate vessels but should not use this for collision avoidance. All radars have blind sectors and may be subject to interference from ship board structures be they cranes, cargo, stations or masts, and a competent Mariner is aware of these, especially if they are member of the ships bridge team, in which case they will be well accustomed to the limitations of the radar installation on their vessel. It is also important to note that a photograph represents a snap shot in time and the monitoring of navigation instruments such as radar are watched continuously. Transit spurious effects are common on radar and a bridge team should be well aware of them - effects such as false echoes are transient in nature, sometimes lasting only a matter of seconds as angles between the radar, the reflective surface and the target line up, but quickly pass as the vessel proceeds on its track. The limitations of radar (especially a poorly installed and configure system) should be well known by a ships bridge team.

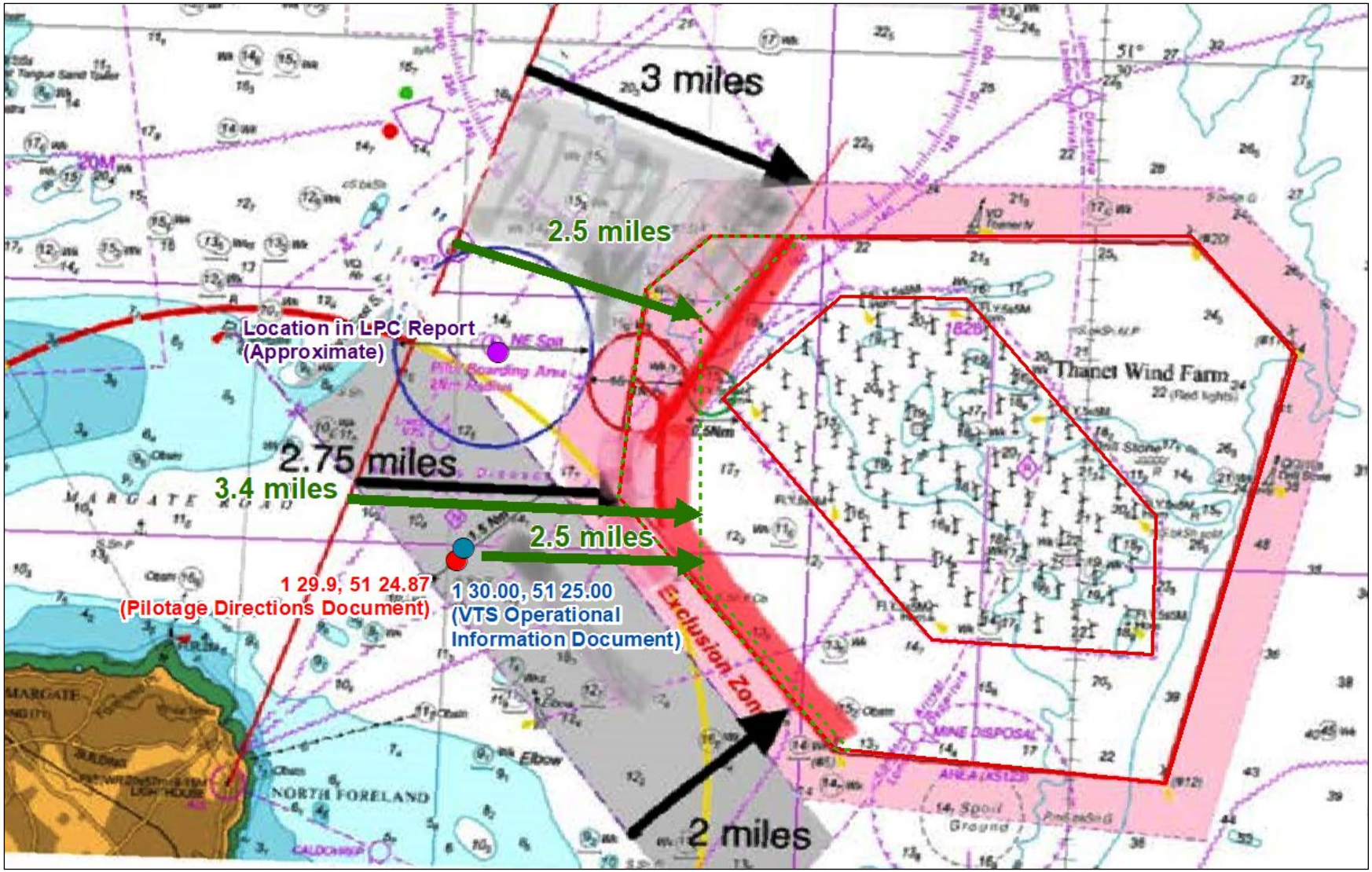
4.1	Although the vessel in Fig.6 transits the Kentish Flats Windfarm at a safe distance of 1.5 miles, Figure 6 shows the loss of target definition for vessels right ahead or end on to the subject vessel due to the reflected echo of the Windfarm off the large self discharge crane at the fore part of the vessel	This Radar picture is poor quality in part because it is not in the right pulse for the range in use. The operator is using pulse length M2 which will send out a stronger signal and therefore any return echoes will come back stronger with more interference. The operator would be better off using short pulse for better definition with occasional use of a higher pulse length. Additionally it is noted that this ship does not appear to have appropriately sectored the radar in set up for its onboard cranes. This is an onboard ship issue and should not be conflated with any effect from wind farm.
4.2	The Mariner must proceed with extra caution as small vessels such as fishing boats and vessels without AIS will not be visible right ahead. Particular caution must be taken when in rain, mist and fog when vessels are not in sight of one another. (COLREGS Rule 19)	The vessels may not be seen on radar but would be seen visually with the human eye. Caution must always be exercised when in restricted visibility only and using radar, the addition of Thanet Extension does not change this.
4.3	The vessel is 1.1 miles to the North of the Kentish Flats Windfarm (Parrallel Index for Princes Deep Water Route). Because of the very prominent effect of the Windfarm turbine echo bouncing off the vessel deck cranes all definition of the	Again the vessel is in the wrong pulse length for the conditions as per 4.1 above. Additionally, the gain control in use is almost at maximum which is far too high. This has caused the radar picture to be severely distorted. A classic indication of this is the ring of interference which can be seen all around the vessel. If the gain was turned down to a more acceptable setting then the picture would become much clearer.

	Windfarm to the South of the vessel is lost and any targets astern of the vessel are also lost.	
4.4	To the NE of own vessel is an ultra large inbound container crossing vessel coming out of the Knock John Channel on a collision course with our subject vessel. The inbound target vessel's radar echo bounces off the deck cranes and obscures the target vessel's AIS signature and target 'paint' until it is auto selected by the radars anti collision feature (ARPA). In restricted visibility only when the target is auto selected then can the Pilot assess the situation and take avoiding action as the target is obscured or hidden from the operator for manual selection. All vessels do not have an auto select target function therefore an extremely dangerous collision situation exists in this photo.	As 4.3 above as the radar has been poorly set up. If this was set up properly the radar picture would be excellent with no effects from the windfarm. The operator would then be able to plot the vessel using radar and determine if a risk of collision exists. The 'dangerous situation' only exists due to the poor setting up of the radar by the operator and is not a function of the proximity to the wind farm.
4.5	This is an example of not just the effects of the Windfarm alone on marine radar but also because of	Please see responses to 4.1 – 4.4.

	the nature of the individual vessel construction and the combined effect of traffic and Windfarm distortion as seen by the Pilot or observer causing an extremely distorted, unreliable and dangerous radar picture for the Pilot to contend with. This picture is at 1.1 miles from a Windfarm. The distortion would be intolerable at the proposed 0.5 miles SEZ and render the Mariner incapable of performing collision avoidance or estimating traffic density	
5.1	LPC Proposed SEZ Distances to the red line boundary in Fig.8 Elbow Buoy total distance to be not less than 2 miles South of the NESP Pilot boarding diamond to be not less than 2.75 miles Pilot boarding diamond to be not less than 3 miles NESP Racon Buoy to be not less than 3 miles	Further narrative is provided on this aspect at Appendix 7 to Deadline 5 submission. We note that Fig 8 (and Fig 3) appear to represent the proposals as provided by LPC (and shared with Trinity House and Vattenfall) on 19-Mar shortly after the Applicant issued the SEZ . It should be noted there are inconsistencies to which are relevant with regard to the measurements stated by LPC. These are: None of these comments from LPC show the SEZ and thus relate to the previous RLB (see sketch below for Applicants overlay of Fig 8 with the SEZ boundary and comparative measurements in green). The LPC appear to have shown NESP PBD circa 2nm north of the location as it is charted and stated on PLA Pilotage Directions or PLA VTS Op Info (“centred on position 51°25’·00N 1°30’·00E”)

		(http://www.pla.co.uk/assets/londonvtsoperationalinformation2018.pdf). This is marked on the sketch below for ExA reference. The LPC do not appear to shown the RLB in the correct location (this may be a georeferencing issue) and the image appears to be distorted. With regards to the LPC stated requirements and in relation to the SEZ: ***Elbow Buoy total distance to be not less than 2 miles.*** This has been met by the proposed SEZ and 2.1nm has been provided. ***South of the NESP Pilot boarding diamond to be not less than 2.75 miles.*** Note this 2.75m (as marked on LPC Fig. 8) is not shown south of NESP PBD as stated (due to NESP PBD being shown incorrectly) but is a lateral measurement from the intersect of the no anchoring line and sector light line (agreed by Applicant as western extent available for 'large' draught vessels) to the wind farm. At this location (which is coincident with the area of greatest transfer density) the SEZ provides 3.4nm of sea room (more than shown in the LPC proposals). At the location south of the location indicated by LPC (and co-incident with the actual PBD location – the SEZ provides a sea room width of circa 2.8nm (2.5nm from NESP PBD to SEZ plus a further 0.33m to the west). ***Pilot boarding diamond to be not less than 3 miles.*** An absolute sea room width at the actual NESP PBD is provided of 2.8nm (2.5 plus 0.33m) at this point which is very close to the 3.0nm requested - noting that immediately north of this point (actually in the area of greatest transfer density) the SEZ provides for 3.4nm of sea room which is in excess of the 3nm requested in any case. We note that in the location that LPC have shown NESP PBD their own 3nm is not met (and extends beyond the North Foreland sector light and on top of NESP Bank) ***NESP Racon Buoy to be not less than 3 miles*** It should be noted that where LPC have shown 3nm the Applicant's SEZ provides this sea room.

		At NESP Racon Buoy, 2.5nm has been provided for at this location for the reasons as stated in the SEZ paper which allows for all stated turning circles and stopping distances provided by LPC (1.45nm and 1.53nm respectively for 333m LOA vessel at Fig 4 table) and/or allows for the concurrent transit and overtaking/meeting scenario of 1.53nm as defined by the MSP with 0.97nm of additional sea room remaining - which can be considered as a buffer. With respect to pilotage operations - a very minor percentage of transfers occur in this location (less than 4.8% and 3.5% of transfers are stated to take place in the areas (as represented by Tongue Pilot Diamond and NE Buoy). In relation to the LPC submission of 3nm – the evidential basis for the 2nm component of this is not clear (D3 stated *'unrestricted sea room of at least 2nm eastwards from the NESP Racon Buoy, to a yet to be determined exclusion zone'*) and relationship to the 1.45 and 1.53nm is not clear but nevertheless we note that 2.5nm satisfies the MSP requirement on basis of 1.53 plus a 0.97nm buffer and satisfies the 2nm basis with a 0.5nm buffer.


3 miles
2.5 miles
Location in LPC Report
(Approximate)
2.75 miles
3.4 miles
2.5 miles
1 29.9, 51 24.87
(Pilotage Directions Document)
1 30.00, 51 25.00
(VTS Operational
Information Document)
Exclusion Zone
2 miles
Thanet Wind Farm
MARGATE
NORTH FORELAND
Elbow
MINE DISPOSAL
Spoil Ground

VATTENFALL

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Response to PLA / ESL Deadline 4C Submission

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
N/A	
N/A	
N/A	

Contents

1 Responses to PLA/ESL D4C representations

1 The following document provides the Applicant's responses to the D4C representations made by PLA and ESL

2 Stakeholder Representations

Ref#	PLA / ESL Rep	Applicant Response
2.1.2	If the MSP guidance had been fully evaluated it would suggest, if it is assumed that there are over 4400 vessel transits through the inshore route (such figure being based on growth of 10% or above), the following: (333x2)+(333x2)+(333x2) = 1998 m (suggested lane width). + 0.3nm (555m)+(6x333)+500m = 3053 (safety buffer for a starboard turn as suggested by COLREGS.	The MSP document has been taken into account following on from the LPC submission at Deadline 1. The total distance calculated by PLA / ESL is 5051m = 2.73nm. The Applicant has no particular response to suggested sea lane width at 1998m = 1.07nm. In response to the sea room buffer element the Applicant would note that whilst the PLA / ESL state 3053m (1.64nm) for a round turn, that the MSP document does not mandate the need for a round turn of the largest vessel to account for a sea room buffer and actually points to the need for the assessment to be site specific. The MSP is clear a sea room buffer should be based on specific local considerations, and it is noted that vessels navigating around the current TOW do so up to 0.5nm from the WTGs – which is considered a safe sea room buffer for current mariners transiting the site, and appropriate to the site. Also within the Thames Estuary the London Array Offshore Wind Farm is located only 0.5nm from the deep draught (large vessel) channel to the Port of London. Also, previously PLA / ESL have advised 1nm sea room buffer – the PLA non-area specific calculation provided here now provided gives 1.64nm resulting in a 64% increase. Allowance has a been made in the Applicants calculation for sea room buffer of 1nm.

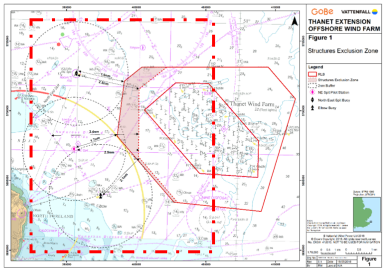
2.1.5	It would then be necessary to consider the acceptable sea room for boarding and landing purposes and which allows for the NE Spit bank to the North West, the shallower water to the South West, Margate Roads anchorage and the associated crossing traffic ESL and the PLA recognise the relevance of both MGN543 and the above mentioned MSP document. However, they consider that the guidance needs to be applied in an appropriate manner and sea lane calculations need to be adapted to allow for boarding and landing practices. ESL's and the PLA's concerns regarding the compression of the inner boarding ground area, combined with the likely increase in traffic density have not been changed by the introduction of an SEZ of the limited geographic extent proposed by the Applicant and which is similarly limited in the scope of its exclusions.	Pilot boarding sea room requirements have previously been provided by PLA / ESL of 2nm clear sea room plus 1nm buffer at NE Spit Pilot diamond – it is not clear whether this is now being reviewed or updated.
2.1.6 – 2.1.7	From the limited time that the PLA and ESL have had to review the SEZ proposal, they understand that the exclusion would prevent the erection of wind turbine generators, meteorological masts, wind buoy and floating Lidar in the SEZ. However, according to paragraph 10 of Appendix 14 to the Applicant's Deadline 4 Submission, other activities "such as vessel manoeuvring, anchor handling and, jack-up barge placement will be possible, as well as cable laying. Any	The SEZ has been clearly defined and identified in the SEZ Paper and is a standard approach, used for other projects (Ref: REP4-018, Appendix 14 to Deadline 4 Submission). The purpose of the SEZ is to provide additional sea room for shipping and navigation. A workshop on 27 Feb was held with all interested parties to identify sea room requirements – however no proposals were made by IPs on geographic layout or absolute spatial requirements.

	other long-term (but moveable) structures as requested by the relevant authorities, such as demarcation buoyage will be permitted." It appears that other works, including structures such as substations and cabling, and other activities, including maintenance, would still be permitted and the PLA and ESL would welcome the opportunity to clarify this with the Applicant. The amount and types of activity which would still be permissible within the SEZ mean that the majority of the PLA and ESL's concerns about sea room remain. It would seem that all ancillary works under the DCO would still be permitted in the SEZ. This covers a wider array of activities including the placing of temporary landing places/moorings for construction and maintenance. The PLA and ESL are concerned about any potential encroachment into the available sea room.	The Applicant has provided a detailed submission in response to the ISH8 Action Points regarding the activities that may be carried out within the SEZ at Appendix 7 (Annex A) to this Deadline 5 submission.
2.2.1	Figure 1 included at Appendix 1 illustrates the concerns of the PLA and ESL with regards to the SEZ. As shown in Figure 1, the width of 2nm + 1nm buffer has become a narrow 'column' which is approximately 1.3nm deep. In order to utilise this area ESL will have to bring a higher number of vessels into a smaller boarding ground which will lead to appropriate lees being compromised.	The Applicant considers that the PLA / ESL 2nm plus 1nm sea room request was made for the area of the NE Spit Pilot diamond, and not for all areas of where pilotage boarding currently takes place over a large area of sea. The 1.3nm spread of 2nm + 1nm clear sea room is a significant area, and relates only to vessels that are restricted in draught such that they are not able to transit the NE Spit bank (which accounts for less than 5% of vessel transits).

	There is not a clear 2nm with 1nm buffer North of line B until East of North East Spit Buoy, which itself is 3nm North of the inner boarding position. South of line C in Figure 1, there is not an area of 2nm with 1nm buffer until approximately 3nm South East of the Elbow Buoy.	The area of most sea room currently with the SEZ in place for deep draught vessels, at a maximum of 3.4nm width (obscured in the PLA marked up plot referenced as Figure 1 at Append 1) is at the location of highest pilot transfer density for the NE Pilotage transfer area. Elbow is characterised as a low-density area for pilot boarding / landing, with PLA / ESL noting at Appendix 2: ESL Working Area (2018) that 3.7% of transfers occur in this area, which is a 50% uplift compared to 2017 figures.
2.2.2	The area East of line A is highly used for pilot boarding and landing operations in comparison to the area West of line A. In 2018, there were 668 boarding and landing acts West of line A in Figure 1 with the vast majority disembarking a pilot. In contrast, 5265 vessels were served in the vicinity of the inner boarding ground East of line A. This is illustrated by Appendix 2 to this submission: ESL Working Area (2018).	This corresponds to analysis undertaken by the Applicant which shows the densest area of pilot transfers occurs around 0.5nmm north of the NE Spit pilot diamond where the total width for deep draught vessels is 3.4nm.
2.2.3	The southern approach to the inshore route will remain heavily impacted, even with the SEZ as proposed by the Applicant. The Applicant's submission Appendix 14 to Deadline 4 – Structure Exclusion Zone (Section 7.2/Figure 7), includes a 1 cable wide SEZ area which is included in sea room and buffer calculations (see Table 13). If turbine blades can cross over into the SEZ (only generators are prohibited under the Applicant's proposals) the 1 cable 'strip' should be included in sea room or buffer calculations. This would mean the distance	The Applicant has confirmed that there will be no oversail of WTG blades within the SEZ.

	between the Elbow Buoy and TEOWF would be 2nm	
2.24	As 2.2.3	N/A
2.2.5	2.2.5 In 2018, ESL served 238 vessels in the vicinity of Elbow Buoy and ESL and the PLA consider that if the extension is completed, even with the SEZ in place as proposed by the Applicant, these vessels will have to be served further to the north at the inner boarding area. This would mean a further 238 vessels being served at the inner boarding position adding to the increase in vessel density in this area.	The Applicant considers that boarding of vessels will continue in this area because the current sea room use of the area has been shown in the data analysis to largely not extend into the TEOW area and the Elbow area has a low density of pilot transfers (3.7%). The majority of vessels landing / boarding a pilot at Elbow are also not required to deviate significantly from their course and therefore sea room requirements are significantly less than to the north where the process of pilot landing / boarding requires dipping vessels to significantly deviate from an optimum course (requiring up to a 180 deg. turn for the very largest vessel) for entry / exit from the Port of London, Further sea room for pilot boarding is also available immediately to the south east of Elbow.
2.2.6	In addition, the PLA and ESL consider it highly likely that vessels, in particular larger vessels, will choose to navigate around TEOWF rather than approach the inshore route at Elbow Buoy. In our experience, larger vessels tend to take a precautionary approach to the boarding ground. This will therefore lead to an increase in traffic approaching the boarding ground from the North East.	The Applicant considers this is not the case and the decision to transit around the wind farm will remain, as it is at the moment, with some vessel captains electing to take the inshore route and others electing to take the outside route depending on a number of factors (arrival time, berth availability, metocean conditions, request for ESL to board inshore, etc.).
2.2.7	In conclusion, the PLA and ESL do not consider the proposed SEZ adequately deals with their	In the absence of specific considerations on SEZ geometry being provided by the PLA / ESL at the SEZ workshop, then the PLA / ESL 2nm + 1nm metric for operational area has been used to define the sea room for pilot boarding at the

	concerns raised about restrictions placed on sea room by the proposed extension.	highest density (operational) area of pilot transfers to the north of NE Spit Diamond as noted in the PLA / ESL Appendix 2: ESL Working Area – as accounting for 91.8% of transfers at ESL working areas for NE Spit
3.2	The NRA addendum was issued by the Applicant following a risk assessment workshop held on 29 March 2019. This workshop was convened as a result of concerns of the IPs about the lack of consultation on the original NRA and concerns regarding the disconnect between the quantitative risk assessment scores and the qualitative concerns raised by the IPs.	The Applicant does not agree that a lack of consultation occurred and that consultation with the PLA / ESL has been significant as evidenced in the meetings, workshops, and studies (pilotage simulation) that have been undertaken. It is also the case the NRA Addendum and Hazard Workshop was undertaken to provide for an updated NRA based on the SEZ – which was based on stakeholder concerns (albeit it no specific geometry considerations in the TEOW boundary (SEZ) were provided by PLA / ESL).
3.3	In the interest of time, the risk assessment workshop only looked at the area directly to the west of the proposed extension, in relation to the proposed SEZ, as this was considered to be the area of highest concern. There was no time for consideration of the other parts of the proposed TEOWF, such as the Tongue and the Elbow, despite these still being areas of concern to the IPs.	PLA / ESL are incorrect in the study area for the hazard workshop – at the start of the workshop a plan showing the extent of the area under consideration was presented and attendees asked to confirm this was appropriate for the hazard assessment (see screen shot from presentation is presented below which identifies hazard area, hazard type and hazard vessel type which was subsequently updated to include commercial vessels of less than 90m).

		Methodology: Step 1 Hazard Identification • Area • Hazard Type • Vessel Type | # | Area | |---|---| | 1 | West TEOW | | # | Hazard Type | |---|---| | 1 | Collision | | 2 | Contact | | 3 | Grounding | | # | Vessel | |---|---| | 1 | Class 1 & 2 Vessels (including LNG vessels) | | 2 | Class 3 & 4 Vessels (including DG vessels) | | 3 | Fishing & Recreational | | 4 | WSV | | 5 | Pilot Launch | 
3.4	The 18 hazards for assessment were agreed by the workshop attendees at the start of the meeting. There was limited agreement between the Applicant and the IPs on appropriate scores. The Applicant's consultants, Marico Marine, provided statistics to justify why scores should be within a certain range but, due to the limited collection of incident data, a lot of the scoring was based on historical, national data. This may be appropriate for sense checking some of the baseline scores, but the PLA and ESL do not consider it as appropriate for the inherent score. The inherent score is based on a change to the baseline situation, when a new hazard is introduced which has not yet been mitigated. Using historical data relating to areas where similar vessels are operating cannot give an	The hazard workshop provided a forum for the discussion of hazard likelihood and consequence scores. The discussions were fruitful and wide spread involving all parties in attendance (including the MCA who were in attendance in an advisory capacity but who participated in the debate by asking probing questions and seeking clarifications). Prior to the Hazard Workshop a pack was issued that included a number of items, including a review of historical incident rates for the area from the UK Marine Accident Investigation Branch (MAIB) Database, incident data received from the PLA / ESL - which identified that no collision, contact or grounding incident had occurred related to commercial vessel traffic (received just prior to the workshop as identified at the pre-workshop meetings), vessel traffic data analysis – updated based on the latest dataset, references to national incident statistics and references to specific incident reports requested for inclusion by ESL – e.g. report into the collision of the container vessel *Ever Decent* and the cruise ship *Norwegian Dream*.

	accurate prediction, as to the risk following construction of the TEOWF, as presumably the other national comparisons are areas where local risks have already been mitigated.	Historical incidents rates were used to help inform scoring of baseline hazard likelihoods for commercial vessel hazard scores. Even using this approach however, (and as presented in the NRA Addendum) the hazard likelihood scores were scored higher than the incident rates suggested. For example, the most likely hazard likelihood scores identified for collisions involving commercial vessels were assessed as twice as likely as the incident data suggested from the area. The use of national statistics was used, as it provided for a reference point for the rare event high consequence hazard out comes – primarily associated with the Worst Credible assessment of hazards (e.g. the consequences of the *Ever Decent* and the *Norwegian Dream* incident which was requested for inclusion by ESL, and which occurred outside the study area was discussed, although for the worst credible consequence of Class 1 or 2 vessel a higher level of consequence was actually chosen).
3.5	Once the baseline had been established an increase in likelihood of navigational risk with the TEOWF in place was then considered. Allowance has theoretically been made for a 10% uplift in shipping, but this adjustment to the likelihood score does not translate into an appropriate increase in the risk score, due to the way in which algorithms are used to calculate risk.	An increase in likelihood directly relates to increase in risk scores through the risk matrix, which is as used and adopted by the PLA to manage their port wide risk assessment required by the Department for Transport and the Port Marine Safety Code. It is therefore unclear why the PLA in particular make reference to likelihood scores not translating through to risk scores. The methodology was agreed prior to and at the hazard workshop.
3.6	The scoring process at the workshop was heavily driven and influenced by Marico Marine with limited opportunity for IPs to comment. Having scored the first hazard the IP's were not allowed to see the resulting risk score. The IPs present	The scoring process at the workshop was not driven or influenced by Marico Marine and over 6 hours of discussion, the workshop achieved the scoring for baseline and inherent risk of 4 individual hazards. It is unclear how there was both 'limited opportunity for IPs to comment' and 'substantial discussion and

	were told that it was best not to see them at this stage, because Marico Marine did not want that to influence any further scoring. As a result the IPs were therefore not able to consider the accuracy of the scoring. It should be noted that the consultants from Marico Marine did have access to the resulting risk scores and whether they fell within ALARP. The PLA and ESL are concerned that this could have influenced Marico Marine's own scoring.	debate on each individual consequence and likelihood scores' (point 3.7 of PLA/ESLs response). It was noted by Capt. Moore (for the Applicant) that it would be good to review the risk scores once the first hazard had been scored for the baseline assessment. However, it was noted by the workshop facilitator, Dr Ed Rogers, that input scores for all hazards should be identified for the baseline and inherent assessment prior to calculating the risk scores, so that the risk score results didn't affect the workshop attendees view on hazard input score which should be independent. Cathryn Spain (PLA) stated at the workshop that this was the appropriate process to follow at the workshop as it didn't presuppose the input scores with output risk scores. The accuracy of the scoring should relate to the input of hazard likelihood and consequence not whether the resultant risk score meets that expected / wanted by the individual. The workshop facilitator – Dr Ed Rogers - did not have access to resultant risk score at the workshop – the hazard log being entering was shown on the screen to all IP's with the process was open and transparent. It is important to note that the scores entered into the Hazard log for the 4 hazards assessed at the workshop were those agreed by all workshop attendees – and were not derived by Marico Marine. No specific request for changes in hazard scoring on either the 4 hazards scored at the workshop or the 14 hazards as initially scored by Marico Marine were received after the workshop despite requests being made for review of the hazards not scored at the workshop, with the exception of DPWLG who requested increase to some consequence classifications input scores on the day of releasing the NRA Addendum – which was included as a sensitivity.
3.7	The PLA and ESL representatives present found the approach to the scoring process during the workshop difficult. There was substantial	The purpose of the hazard workshop was to illicit risk scores based on IP's knowledge, which was undertaken for the 4 hazards assessed on the day for the baseline and inherent risk profiles. Hazard workshops, such as the one

	discussion and debate on each individual consequence and likelihood scores. This meant that the group only managed to score 4 out of the 18 identified hazards during the six hour workshop. This approach did not address the disparity between the quantitative and qualitative aspects of the NRA, a key concern of ESL and the PLA, because the majority of the day was spent trying to come to an agreement on the scores. Very little time was given to further exploring the concerns of the IP's with regards to the increased risks posed by the TEOWF.	undertaken on 29th March, are frequently carried out by the PLA (and possibly to a lesser extent for ESL pilot boat crews) and as such most personnel attending should be familiar with the methodology, especially those personnel charged with the management of navigation safety. Indeed, it is apparent though not documented (see 3.12) that the PLA conducted their own hazard workshop to generate an alternative risk assessment. Time was limited at the workshop and this was associated with the length, breadth and depth of discussion held in characterising the baseline risk scores. However, it was noted by Cathryn Spain amongst others, who have attended such workshops before, that as a workshop progresses the debate on individual scores decreases and the pace of assessment increases. This was evident at the workshop, though there were extensive discussions held – which ventilated issues, and sparked debate. Much of the debate and discussion that took up the valuable workshop time emanated from the PLA / ESL / LPC. With reference to control measures then the workshop did discuss those control measures that included in the original NRA however, but it was not appropriate to define control measures, when the need for them had not been ascertained – time was taken up scoring four hazards for Baseline and Inherent risk profiles.
3.8	ESL and the PLA consider that the majority of workshop would have been best spent trying to understand and agree the risks, and consider whether they were tolerable or required further mitigation. The scoring process could have been a simple exercise at the end of the day to translate the outcomes into a scored assessment format. These views have been communicated to the Applicant.	The Applicant is not clear what the expectation of PLA / ESL to "understand and agree the risk" relate to – risk is a function of hazard likelihood and hazard consequence – which as noted in the PLA / ESL response was the focus of the workshop and of much discussion and debate. The need to identify risk control measures (mitigation) can only be commenced once the assessment of risk for the Baseline and Inherent Assessment has been carried out. The PLA /ESL seem to suggest a short cut exercise is appropriate for

		mitigation, without identifying the need based on a structured qualitative assessment.
3.9	Following the workshop, and having had time to reflect on the process, the PLA and ESL felt that some of the hazards had been underscored for their baseline consequence and therefore the baseline risk was too low. The PLA then compared the baseline risk scores to those of the original NRA, which themselves were thought to have been underscored by the Applicant, due to the datasets that were used. The NRA and NRA addendum cannot be directly compared, because the hazard categories were not the same, the PLA and ESL would note that the highest baseline collision risk identified at the workshop was scored lower than the highest baseline collision risk in the original NRA	The underscoring of hazards is not evident in the baseline case (no TEOW) for the hazards scored during the workshop when compared to the historical incident rates calculated in the study area. In fact the baseline likelihood scores put forward as part of the workshop were more likely (up to double the likelihood in the case of collisions between commercial vessels) compared to that seen in the available historical data. Also, the consequence scores for the "Worst Credible" hazard outcome were also frequently scored more than would ordinarily be expected (the collision between the *Ever Decent* and the *Norwegian Dream* did not result in major injuries or fatalities – however hazard consequence scores for fatalities were noted for commercial vessel collisions in the worst credible outcome).
3.10	The PLA's and ESL's detailed comments on the NRA addendum are at Appendix 3.	See below.
3.11	The PLA and ESL have also prepared a joint revised risk assessment which is included here at Appendix 4. The scoring for the PLA/ESL risk assessment is based on a similar methodology to that used by Marico Marine and uses a combination of most likely and worst credible outcomes. However, the likelihood is scored using a 1-5 matrix, and multiplied by the	The Applicant notes that the PLA / ESL use the same hazards identified as part of the Addendum NRA and are therefore must be agreed by the PLA. The Applicant would also note that there is very little supporting methodological information contained with regards to the PLA / ESL NRA included in Appendix 4, including

<table>
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<td>consequence score, giving a risk score between 0 and 25, as opposed to using a complex set of algorithms, which result in a score out of 10.

3</td>
<td>Details of the nature of the risk scoring are not given including workshop attendees and baseline data inputs (incident analysis, vessel traffic data analysis).

No details on the hazard likelihood classification are given.

Details on the risk algorithm used are incomplete with regards to combining risk scores for the “Most Likely” and “Worst Credible” outcomes of a hazard.

The nomenclature of the likelihood and consequence categories is not carried through into hazard logs – they do not match which makes it difficult to cross reference the reasons for the scoring.

All hazard risk scores assessed by the PLA / ESL fall into the moderate risk “Action key” category (the lowest of two ALARP level “Action Key” categories – Moderate / High Categories) or lower for the baseline assessment. This category, which is defined with the Appendix 4 methodology as “Moderate (5 – 9) - Additional controls required to reduce risk to ALARP” does not align to the standard categories used by the PLA which states “Moderate (5 – 9) - Efforts should be made to reduce risk to ‘As low as reasonably practicable’ (ALARP), but activity may be undertaken.”

Action keys from both methodologies are presented below:

Action Key from PLA Appendix 4 NRA Methodology

<table>
<tr><td rowspan="5">ACTION KEY</td><td>Slight (1 – 2)</td><td>Tolerable. No action is required</td></tr>
<tr><td>Minor (3 – 4)</td><td>Tolerable. No additional controls are required, monitoring is required to ensure no changes in circumstances</td></tr>
<tr><td>Moderate (5 – 9)</td><td>Additional controls required to reduce risk to ALARP</td></tr>
<tr><td>High (10 – 14)</td><td>Activity must not be undertaken without further additional controls to reduce to ALARP</td></tr>
<tr><td>Extreme (15 – 25)</td><td>Intolerable risk. Activity not authorised</td></tr>
</table>

Action Key from PLA Navigational Risk Assessment Pro-forma</td>
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<table>
<tr><td></td><td></td><td>Available at
https://www.pla.co.uk/assets/fm197plariskassessmenttemplate.xlsx

Accessed 19:56 29/04/2019

<table>
<tr><td rowspan="5">ACTION KEY</td><td>Slight (1 – 2)</td><td>No Action is required</td></tr>
<tr><td>Minor (3 – 4)</td><td>No additional controls are required, monitoring is required to ensure no changes in circumstances</td></tr>
<tr><td>Moderate (5 – 9)</td><td>Efforts should be made to reduce risk to 'As low as reasonably practicable' (ALARP), but activity may be undertaken</td></tr>
<tr><td>High (10 – 14)</td><td>Efforts should be made to reduce risk to 'As low as reasonably practicable' (ALARP). Activity can only be undertaken with further additional controls.</td></tr>
<tr><td>Extreme (15 – 25)</td><td>Intolerable risk. Activity not authorised</td></tr>
</table>

The Applicant also notes that the Tilbury 2 NRA (applies a similar PLA methodology – but with an action key analogous to the PLA Navigational Risk Assessment Pro-forma recorded higher risk scores in their DCO submission for their "Inherent" (12/25 – high risk) and "Residual" (9.2/25 – Haz ID 14) assessment of risk than PLA / ESL NRA Addendum risk assessment does.

Comparison of NRA input consequence scores between the PLA / ESL NRA Addendum input scores shows minimal differences in hazard baseline consequence scores for the Most Likely consequence scores (81% of the 72 scores consequence input scores for the 18 hazards remained the same) and there is an even smaller differences for the Worst Credible assessment (97.2% of consequence scores for worst credible remained the same).</td></tr>
<tr><td>3.1.3</td><td>Both the PLA and ESL want to continue to work with the Applicant in seeking a solution suitable for all parties involved. The SEZ as proposed by the Applicant is insufficient in its geographical extent and would still permit activities and works to be carried out within the SEZ which would pose a risk to ESL's and the PLA's operations</td><td>The Applicant remains committed to working with PLA/ESL to seek a solution and common ground. However the Applicant notes that the PLA and ESL state the geographical extent of the SEZ is not sufficient, and the Applicant remains unclear on the expectation the PLA / ESL have in the extent of any geographical change they propose to the SEZ.

The Applicant is willing to clarify any point the PLA / ESL have in regard to use of the SEZ and work with PLA / ESL to accommodate any concerns they may have on the details of the SEZ.</td></tr>
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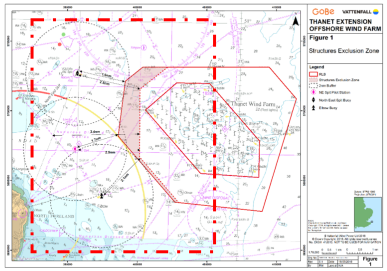
3 Appendix 3: PLA and ESL response to NRA Addendum

Ref#	PLA / ESL Rep	Applicant Response
Para 5	The workshop was driven by Ed Rogers from Marico Marine, who was aware of the risk scores for baseline and inherent risk, whereas the IPs present were given not access to the scores that resulted from the likelihood and consequence scoring.	The workshop was facilitated by Dr Ed Rogers of Marico Marine, who's primary goal was to accomplish as much as possible in the time available. This involved facilitating the workshop for participants familiar with the NRA hazard workshop process, such as the PLA, and those less familiar with the process. The workshop facilitator – Dr Ed Rogers - did not have access to resultant risk score at the workshop – the hazard log being entering was shown on the screen to all IP's. The process was open and transparent. It was noted by Capt. Moore (for the Applicant) that it would be good to review the risk scores once the first hazard had been scored for the baseline assessment. However, it was noted by the workshop facilitator, Dr Ed Rogers, that input scores for all hazards should be identified for the baseline and inherent assessment prior to calculating the risk scores so that the risk score results didn't affect the workshop attendees view on hazard input score which should be independent. Cathryn Spain (PLA) also stated that this was the appropriate mechanism to conduct the workshop as it didn't presuppose the input scores with output risk scores. This was confirmed at ISH8.
Para 6	The PLA and ESL did discuss the scores from 29 March at the telephone meeting on 2 April, as they had concerns that some of the consequences for the collision risk had been underscored. Another IP raised a concern that some of the grounding consequence scores	The Applicant can confirm that the concerns raised by PLA/ESL, and the request made by DPWLG/PoT have been reflected where appropriate within the updated NRA Addendum submitted for consultation. It is however also noted, as confirmed at ISH8, that the PLA harbour master is experienced and familiar with the hazard scoring process and

	had been underestimated and followed this up with emails to the Applicant, but these scores were not adjusted as a result. At the workshop the group only managed to complete 4 of the 18 hazards identified and found the process very challenging. A lot of time was spent trying to come to agreement on each score rather than focussing on the "cause concern and consequences" and the areas of ongoing concern. The PLA and ESL have undertaken a separate risk assessment to address theirs, and others' concerns over the scoring of each hazard.	as such the scoring process at the workshop was considered to be appropriate. This is also reflected in the confirmation issued by MCA that the hazard log accurately reflected the outcomes of the day, which had been marginally slower than other hazard workshops.
Para 9	The scored risk assessment that was undertaken on 29 March only focussed on a small area the west of the SEZ and did not relate to the whole red line boundary	PLA / ESL are incorrect in the study area for the Hazard Workshop – at the start of the workshop a plan showing the extent of the area under consideration was presented and attendees asked to confirm this was appropriate for the hazard assessment (see screen shot from presentation below which identifies hazard area, hazard type and vessel type).

		Methodology: Step 1 Hazard Identification • Area • Hazard Type • Vessel Type | # | Area | | 1 | West TEOW | | # | Hazard Type | | 1 | Collision | | 2 | Contact | | 3 | Grounding | | # | Vessel | | 1 | Class 1 & 2 Vessels (including LNG vessels) | | 2 | Class 3 & 4 Vessels (including DG vessels) | | 3 | Fishing & Recreational | | 4 | WSV | | 5 | Pilot Launch | 
Para 14	In referencing the MSP Guidance (for example in the Applicant's response to Gateway Port Limited – page 36 (Appendix 4 to Deadline 4: Response to Deadline 3 Submissions by Interested Parties – Shipping and Navigation), the Applicant has underestimated vessel passages because it has not allowed for growth. This has led to the assumption of 2 vessels for lane calculation instead of 3 and did not factor in the safety buffer formula MSP recommends. (Although confusingly later in the addendum the Applicant references MSP and allows for 4 vessels)	The vessel lane calculations have used 4 x 333m vessels – despite vessel numbers not being at the frequency to apply the 4 vessel multiplier rule. See comment above at 2.1.2 and response to Paragraph 68 below.
21	Although ESL and the PLA appreciate the time constraints of the Examination, it is disappointing that there was not enough time	The CRM undertaken for the original NRA showed that up to a 54% increase in encounters could be expected with TEOW, albeit was a conservative assessment. However, when scoring the hazards during the

	to re-do the collision risk modelling (as stated by Marico on a call on 22 March).	workshop, the change in likelihood for the inherent hazard scores were scored as more frequent than this for collision with commercial vessels, even with the SEZ in place. Additional CRM modelling with the SEZ in place would only show a lower % change in encounters than no SEZ.
28	Recreational vessels are highly seasonal; August would have been a more accurate representative month to study. The only way the Applicant could accurately study August would be through on site survey. By contrast, what it presents in the addendum is an assumption based on AIS (which a large number of leisure craft do not have) and the RYA boating intensity map (which is 100% based on AIS).	The original NRA utilised the MGN compliant survey and the RYA approved recreational craft density data. The RYA have not raised any concerns over the data used.
32	It is not clear whether Figure 16 is accurate. Firstly, the scale of low/medium/high is vague; Marico have previously stated that they would try and put the scale into numbers, but neither the PLA nor ESL have yet seen this. There are other reasons a pilot vessel will slow down to 10 or 7 knots (ESL could be waiting for vessels or the MetOcean conditions may have slowed the pilot vessel down). Using the colour scheme as a guide shows there is a low to medium density around the East Margate (ESL served 690 vessels there in 2017) there is a similar low to medium colour scheme shown under the	ESL had requested the plot be updated to give absolute vessel transfer numbers as opposed to a high / medium / low ranking. This was not possible as explained to ESL and as contained in the figure caption, the analysis is made on vessel speeds and not actual transfer locations. On discussion with ESL it was evident that the transfer location plots produced by them, presented at their Appendix 3 were based on pilot launch logs. As ESL themselves are not able to provide locations for pilot transfers it seems counter intuitive that they would expect more detailed presentation from an indicative analysis approach. As noted to ESL / PLA in previous discussions and the workshop meetings, neither could explain why pilot vessels transit at a slow speed in the area under the North Foreland. The Applicant believes this to be

	North Foreland where no ships were served, which highlights the potential inaccuracies in the Applicant's assumptions.	when the pilot vessel transits at a slow speed whilst waiting for a vessel to approach the pilot boarding / landing area.
42	If a pilot refuses to board a vessel due to a deficient ladder that vessel will then spend more time in the boarding and landing area without a pilot on board. This may be a control measure for the safety of the pilot, but not a control measure for collisions and groundings and is more likely to be a contributory factor.	The Addendum NRA paragraph acknowledges that deficiencies may be a cause of navigation hazards.
43	Whilst understanding Bird's Accident Triangle, it is important to consider near miss incidents such as the Maersk Nottingham, and give them sufficient weight when considering the quantitative risk assessment.	The paragraph accepts this point – *"It is also noted, and discussed at the workshop of the 29th March, that the near misses are helpful qualitative indications of potential issues*"
56	A vessel with a draft over 7 metres will have to take height of tide into consideration when planning to cross the Spit bank. Any vessel with a draft of 10 metres or above will be served at least 1nm East of the inner diamond.	The NRA Addendum paragraph 56 - "*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 whereas it is evidenced 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."* - agrees with the PLA / ESL point (as is also evidenced by the survey data) that deep draught vessels (over 10m draught) will tend to transit to the east and north of the NE Spit RACON buoy.

57	As stated in our Deadline 4C submission, the MSP document the applicant submitted has a buffer formula within it (vessel length x 6 + 500m (exclusion zone) + 555m (0.3nm allowance) which for a 333m vessel means a buffer of 1.64nm. This buffer would allow for a safe turn to starboard but is not the buffer formula employed by the Applicant.	See response to point 2.1.2 above.
66	This area has a high volume of WSVs crossing it at high speed to enter/exit the windfarm. It is also one of the main areas for fishermen to enter and exit the site on transit and is an area frequently fished. Both WSV and Fishermen are relatively high-risk sea users.	It remains the least navigationally complex area due to low density of pilot transfers and no requirement for vessels to dip and undertake up to 180 deg. turn to board a pilot.
67	See comment on 57.	See response to 2.1.2 above.
68	It still appears that the SEZ is based on historical tracks, allowing for no growth.	Growth has been allowed for in the calculations as 4 vessel side by side have been used which is for shipping lanes of over 18,000 movements per year – where as both the inshore route and dipping traffic route are at the boarder of the 2/3 vessels side to side, or within the lower region of the 3 vessels side to side calculations. The MSP state: *"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*

<table>
<tr><td></td><td></td><td>c >18000 vessels: 4 vessels side to side”

Vessel size is also taken into account with this precautionary approach.</td></tr>
<tr><td>70</td><td>The SEZ only provides the requested 2nm + 1nm in the highest density area of pilot transfers and therefore does not allow for any flexibility. This flexibility is required in order to manage transfers in the full range of met-ocean conditions and traffic situations that arise. This is the highest density transfer area which is likely, as a result of the SEZ, will become even denser.</td><td>The Applicant considers that flexibility remains within all areas of the pilot boarding operational area. It is not accepted that in areas with less than 2nm + 1nm no pilot transfers would take place, as is suggested, particularly given that this sea room has been identified for the largest vessels taking into account adverse metocean conditions. It stands to reason that outside of these extremes, pilot transfer could continue in areas of less sea room. Note that ship arrivals have declined at London ports since 2003 – also the pilotage service is currently a one-boat service whereas previously it had been a two-boat service.

A decline is evident in pilotage acts between 2017 and 2018 from ESL Working Area plots. The Applicant also notes that between 2017 and 2018 all pilot boarding areas furthest away from the pilot launch base at Ramsgate declined in number whilst those closest increased in total pilotage transfers – indicting propensity for ESL to serve vessels closer to their base (see table below – note those marked * are areas that do not abut TEOW).

<table>
<tr><th></th><th>2017</th><th>2018</th><th>Difference</th></tr>
<tr><td>Tongue Anchorage*</td><td>16</td><td>12</td><td>-4</td></tr>
<tr><td>Tongue Pilot Diamond</td><td>93</td><td>86</td><td>-7</td></tr>
<tr><td>NE Buoy*</td><td>225</td><td>145</td><td>-80</td></tr>
<tr><td>E-Margate*</td><td>690</td><td>625</td><td>-65</td></tr>
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</td></tr>
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<table>
<tr><td></td><td></td><td>
<table>
<tr><td>Margate Road*</td><td>137</td><td>43</td><td>-94</td></tr>
<tr><td>Ramsgate*</td><td>34</td><td>50</td><td>16</td></tr>
<tr><td>NE Spit Pilot Diamond</td><td>5199</td><td>5265</td><td>66</td></tr>
<tr><td>Elbow</td><td>157</td><td>238</td><td>81</td></tr>
<tr><td>NE Goodwin Pilot Diamond</td><td>28</td><td>50</td><td>22</td></tr>
<tr><td>Total</td><td>6579</td><td>6514</td><td>-65</td></tr>
</table>
</td></tr>
<tr><td>72</td><td>The line of sight is still obstructed by the proposed turbines on the north west corner of the extension. Vessels approaching from the east around the top of the windfarm will have their line of sight to the North Foreland light obstructed.</td><td>This is the case with the existing TOW and was not identified as a particularly concern in the 2015 PLAs NE Spit risk assessment.</td></tr>
<tr><td>90</td><td>The PLA and ESL and LGP expressed concerns regarding the hazard scores from the workshop. Vattenfall agreed that they should take a robust approach to the scoring, but did not subsequently adjust any of the scores.</td><td>A robust approach has been used as demonstrated by increases for baseline and /or inherent risk which are greater than analysis, modelling, or industry best practise dictate.</td></tr>
<tr><td>97</td><td>Vessel types were only defined by the length according to the PLA pilotage category. The PLA also categorises vessels by draught, but this was not taken into consideration for the workshop.</td><td>Vessel types have not been categorised by length but by PLA Pilotage class for the hazard log.</td></tr>
</table>

99	The area to the west of TEOWF is the area that was agreed as being of most concern but is not the only area of concern to the IPs. This again draws attention to the time pressure: other areas were not considered in discussion because of insufficient progress and time available.	Hazard areas for the hazard log was as shown at the hazard workshop (see response to paragraph 9 plot above). PLA / ESL agreed to the area under consideration.
118	The two master mariners used by Marico do not have pilotage experience of class 1 & 2 vessels in the area being assessed.	The Applicant has provided a detailed response to the ISH8 Action Point (at Appendix 7 of this Deadline 5 submission) regarding the experience of the master mariners providing technical input to the project.
124	The PLA and ESL are not clear on what evidential basis the Applicant states that fishing and leisure traffic have a static or downward trend.	Evidence in national trends for recreational craft (boat ownership trends show static numbers between 2007 and 2017) and fishing vessels (pg 13 of UK Sea Fisheries Statistics 2017 – MMO - shows <=10m vessel no. at 2014 – 2,573, 2015 – 2,598, 2016 – 2,569, 2017 - 2,512). Thanet Fisherman's Association have also stated that due to economic reasons the fishing vessel numbers have not increased in the area.
125	Given the relatively new status of the WSV working practices it is likely that WSV traffic will not remain the same. For example, the London Array is currently undergoing an intensive maintenance programme which has increased WSV capacity to 12. They have also, within the last 12 months, started working at night. It would be reasonable to assume that as various sites expand and age maintenance programmes intensify, there will be increasing demand for WSVs and increased working	It is noted that there will be fluctuations in WSV, as there is at the moment depending on life cycle stages of offshore windfarms. This is taken into account in the baseline and inherent assessment of risk.

	hours (meaning more night work). The only uplift in WSVs that the Applicant has accounted for is for their own windfarm; however, three windfarms operate WSVs from Ramsgate.	
134	Navigational risk controls are dominated by monitoring and remote management (e.g. VTS). Any navigational issues post construction will have to be mitigated by shipping not the TEOWF. It seems unlikely that any navigational problem areas caused by the TEOWF would lead the Applicant to address those sufficiently by the removal of wind turbine generators.	VTS has not been referenced in para. 134. The Applicant has reduced the RLB and implemented a SEZ, even though navigation hazards remain at tolerable ALARP levels. The Applicant has made these changes, based on qualitative concerns raised during liaison with the IPs at a series of meetings held by the Applicant.

Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Response to POTLL / DPWLG Deadline 4C Submission

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
N/A	
N/A	
N/A	

Contents

2 Responses to Port of Tilbury and London Gateway D4C representations.

1 This document presents the Applicants responses to issues raised by POTLL / DPWLG in their Deadline 4c Submission.

3 Stakeholder Representations

Ref#	POTLL / DPWLG Rep	Applicant Response
3	The NRAA has been developed in order to assess the acceptability of the Structures Exclusion Zone (SEZ) proposed by the Applicant at Deadline 4 (REP4-018). The ports acknowledge that the SEZ provides a concession and an improvement on the previous position taken by the Applicant, however until such time as the assessment provided to support the SEZ is sufficiently robust to determine the impacts on shipping and navigation, the two ports are unable to comment fully on whether the SEZ is acceptable or not. As set out below, the two ports are not yet satisfied by the contents of the NRAA	The Applicant acknowledges and welcomes observation of concession and improvement. The Applicant notes the distinction between 'shipping' and 'navigation' - and further notes that the statutory responsibility for safe 'navigation' access in the waters of the study area lies with MCA and PLA.
4	In addition, POTLL and LGPL note that the Applicant has not proposed a reduction in the Order Limits and has sought to deal with this through the use of an exclusion zone as an alternative. The two ports are yet to be convinced as to why using an SEZ is an appropriate means to seek to reduce the impact of the extension to the offshore wind farm and therefore wish to	Details of the basis of the SEZ have been provided at Appendix 14 to Deadline 4 and the use of SEZ has been demonstrated for other projects as an appropriate mechanism to allow use of the area for activities such as cable laying whilst meeting the IP's requirements for additional sea room. The Applicant has provided a detailed explanation of the SEZ, in line with the ISH8 Action Points at Annex A to Appendix 7 of this Deadline 5 submission.

	understand why the Order Limits should not, instead, be reduced.	
7)	LGPL and POTLL's preferred approach is to see a more detailed assessment of risk scores based upon combinations of vessel types and categorisation of vessels which takes into accounts factors beyond only vessel length (such as draft and handling characteristics). It is understood, however, that the Applicant has used a significantly narrower categorisation of vessel types and combinations. LGPL and POTLL are prepared to accept the approach taken, with the caveat that scoring of the risks (i.e. the consequence and likelihood) must take a robust approach in considering the worst-case of the potential combinations/categories.	It is noted and welcomed that LGPL and POTLL accept the approach and the Applicant confirms that as discussed at the Hazard Workshop the "Worst Credible" outcome of hazards were related to the greatest severity vessel sub-types. This is evident in the scoring of likelihood at the hazard workshop which did not follow industry practice of being approximately 100 time less often than the "most likely" occurrence or relate to actual consequences of serious incidents (such as the major collision of the *Norwegian Dream* with the *Ever Decent* which did not result in any serious injuries of fatalities – however worst credible consequence scores for Class 1 and 2 vessels included multiple major injuries / fatality).
8)	Paragraphs 119 to 125 of the NRAA discuss future traffic growth with reference to statistical data for the period 1994 to 2017 (represented by Figure 26). Therein it is suggested that the growth in the number of cargo ship calls to the Port of London has been relatively flat over this period. Paragraph 120 acknowledges the additional committed facilities at DPWLG and POTL, however it suggests that "these ports individually	The Applicant notes that DPWLG and POTLL vessels are a significant proportion of the vessels entering London ports (but not the majority), however in the vicinity of the TEOW and specifically in the inshore route then POTLL and DPWLG vessels, according to the HRW report which appends the Representation are a minority of vessels transiting past the proposed TEOW. The Applicant notes specifically, and with reference to HRW report as well as Applicant data, that it appears to be agreed that a minority of the vessels accessing POTLL and DPWLG vessels are transiting the inshore route and using NESP PBS.

	make up a minority of vessel movements in the Thames Estuary".	
9)	The two ports refer to the HRW Report, Table 4.1 which provides a summary of container ship calls at selected UK ports for the period 2009 to 2017. This demonstrates that the number of container ship calls to the ports of London has increased from a level of approximately 1,000 calls per annum, in 2009 through to 2013, to over 1900 calls per annum in 2017, an increase of approximately 90%. It is to be noted that the start of this period of rapid growth corresponded with the opening of the first berth at DPWLG and that the third berth did not become operational until Q2 2017. With consent for up to seven berths (and a current intention to develop six) at DPWLG, it is clear that the potential for a further significant increase in the number of container ship calls to the Port of London exists within the 'reasonable planning horizon'. POTLL and LGPL have provided additional information in respect of future traffic growth generally (e.g. with construction of 'Tilbury2', consented in February 2019, already well underway) during the course of the examination and in particular in their Deadline 2 submission (REP2-050).	The Applicant notes that the DfT data shows an increase in container ship calls – however, there is a corresponding decline in container ship calls to the port of Medway and also Felixstowe. Overall ship calls have therefore remained broadly level. The Applicant notes that the growth in ship arrival figures relates to DPWLG coming online, as noted by POTLL / DPWLG. It is important to note that Table 4.1 figures relates only to container ships and not all vessels visiting London Ports, or indeed all vessel passing the TEOW. The Applicant awaits further submission on this at Deadline 5 in response to ExA Action Point 19 from ISH8.

10)	Table 1 of REP2-050 provided information on the total number of ship calls to DPWLG and LGPL in the period 2015 to 2018. It is to be noted that the number of ship calls presented therein for the 2017 calendar year (3872) represents approximately 50% of the total number of ship calls to "London Ports" demonstrated by Figure 26 of the NRAA in the corresponding year. Thus, we contend that the statement at Paragraph 120 of the NRAA is misleading and that, in fact, ship calls to DPWLG and POTLL, which are the subject of rapid growth as discussed in paragraph 9 above, comprise a very significant proportion of all ship calls to London Ports.	Data presented at Figure 26 of the Addendum NRA is derived from Department for Transport (DfT) Ship Arrival statistics, this data relates to vessel types as described by the DfT - *"To give a consistent time series, this table includes only the first four ship types of Table PORT0601 - tanker, ro-ro, container and general cargo vessel."* The data presented demonstrates the significant decline in vessel numbers visiting London ports, whilst cargo volumes largely remain static. It essentially demonstrates the trend towards larger ships. It is not clear that the figures submitted by POTLL at REP2-050 are comparable to these numbers, as it is unclear whether POTLL figures have been collected in the same manner and to the same standards as the DfT or whether the data includes other vessel types, such as passenger vessels (e.g. cruise ships) intra port trade, tug and tows etc., not considered in the DfT data.
11)	Minded by the above the two ports remain of the view that the 10% allowance for future growth applied to the NRA and NRAA is completely insufficient to account for potential future traffic growth to the ports of London (and critically transiting the inshore route and utilising the NE Spit pilot boarding station) in the 'reasonable planning horizon', which the Examining Authority defined in ISH2 Action Points (EV-003) as "+35 years from 2019". In respect of future traffic growth the NRAA is therefore seriously deficient.	The Applicant notes that DPWLG and POTLL vessels are a significant proportion of the vessels entering London ports, however in the vicinity of the TEOW and specifically in the inshore route then, according to the HRW report which appends the Representation, then : • There is a clear decline in vessel numbers visiting the London and Medway ports (Figure 4.3) • 534 vessels between 30/11/2017-30/11/2018 inbound (it is not clear from the data whether the vessels also used the route outbound or not from the report) for the POTLL used the inshore route out of a total number using the inshore route of 4745. • The estimate made by HRW assumes that 50% of inbound POTLL ships transfer a pilot at NESP PBS (and presumably also includes the Tongue Deep Water Diamond).

		• 79 ships between 30/11/2017-30/11/2018 transited inbound (it is not clear from the data whether the vessels also used the route outbound or not from the report) destined for the DPWLG used the inshore route out of a total number using the inshore route of 4745. • 15% of the vessels inbound to DPWLG transfer a pilot at NESP PBS (and presumably this also includes the the Tongue Deep Water Diamond) as opposed to 85% using the SUNK pilot boarding area. Based on a net decline of vessels, the small percentage of total vessel designated for / from POTLL and DPWLL using the inshore route, the trend towards larger ships that would not be able to transit the inshore route due to depth and / or other restrictions, and taking account the increases possible at POTLL And DPWLG there is likely to be no net increase in vessel numbers using the inshore passage and that in all likelihood it vessel numbers will decline. In summary – the Applicant notes that a minority of the vessels accessing POTLL and DPWLG vessels are transiting the inshore route and using NESP PBS.
12)	LGPL and POTLL do not agree with paragraph 22 of the NRAA, which concludes that the data presented in the NRA was representative of the breakdown of vessels using the study area. The assessment in the NRAA now considers vessels of up to 333m LOA which gives some greater comfort with regard to vessel transits via the inshore channel however the analysis of the	The hazard logs in the Addendum NRA account for all Class 1 and 2 vessels visiting the NE Spit. It is understood that vessels of 333m and above are risk assessed on an individual basis for each transit to and from the port (noting there appears to be confusion with PLA/LPC on whether an overarching risk assessment has been undertaken for vessels of this size (at a limited draught)). Consideration of 400m vessels has been given within the precautionary approach to defining sea room. As set out in the SEZ note (PINS ref: REP4-018) in using 4 x 333m vessels as the starting point for identifying sea room, up to 3

	breakdown of vessels remains deficient. With regard to pilotage operations, it was DPWLG and POTLL's understanding that consideration of vessels of up to 400m LOA and 11.5m draft was agreed at the Post Hearing Workshop on the 2nd February 2019, however it is not evident that this has been borne out in the NRAA hazard scoring.	400m vessels could also transit these areas concurrently. It is unclear as to whether a 400m vessel would ever transit through the inshore route with or without the TEOW, and to date, it appears that no vessel larger than 333m has ever gone through this area, despite many 400m vessels transiting to the east of the wind farm.
13)	With reference to survey data, the NRAA highlights that less than 1% of vessels transiting the inshore route are in excess of 240m. It should be noted however that this 1% represented 78 vessels. Should there be a requirement for vessels over 240m to be re-routed to the east of the TEOWF, LGPL and POTLL therefore contend that this would represent a material economic impact which should be considered, particularly in light of the potential growth in ship calls in the 'reasonable planning horizon' discussed in paragraphs 8 to 11 above. The economic cost diversion of ships from the inshore route to the east of the TEOWF is discussed in more detail in the HRW Report.	The Applicant does not agree that there would be a need for any vessels to deviate around the wind farm and that based on guidance (MGN 543 & MSP), sufficient sea room, in addition to a safety buffer remains post construction of the TEOW. It should be noted that in the PLA provided AIS data (as provided to Applicant on 27-Mar-19) 52 of 4744 (<1%) vessels of greater than 240m LOA utilised the inshore route (gate 1) whereas 1070 of the 12624 (8.5%) vessels transiting the offshore route (gate 2) and, by way of context, this demonstrates that the inshore route is not characterised by vessels in excess of 240m LOA. It cannot therefore be inferred that the ratio of distribution of traffic west/east of the wind farm will change due to factors of Master choice. Outwith of this, it is also the case that any economic cost needs to consider that even large vessels frequently stooge (wait) at the entrance to ports for a number of factors such as berth availability, tide, pilot, etc. Such that any deviation, were it necessary, does not necessarily impact vessel transit time.

14)	LGPL and POTLL will consider the final response of the shipping and pilotage organisations who are Interested Parties in the examination process in respect of the appropriateness of the hazard scores (consequence and likelihood). It is noted, however, that throughout the discussions with the Applicant and IPs regarding the NRAA scoring, LGPL and POTLL have contended that the scoring applied to the consequence for stakeholders in the most likely scenario (the concept of which is set out in Table 17 and paragraph 81 of the NRAA) is significantly understated. For example, a collision between two vessels (which could be two Class 1 vessels or a Class 1 vessel with, for example, a fishing vessel) is scored as "Category 1" (defined by Table 17 of the NRAA as "negligible" with an associated cost of under £10k). It is the contention of LGPL and POTLL that the cost to business of such an incident could be significantly in excess of this (particularly when taking account of matters such as reputational damage, vessel damage assessment, accident investigation and associated loss of sailing time). The same applies to the grounding of a class 1 vessel which LGPL and POTLL contend has the potential to significantly exceed the stated "Category 2" (Minor – costs £10k to 100k).	It is noted that POTLL and DPWLL have not provided any detailed comment on the hazard scores to the Addendum NRA (and neither has LPC) and as POTTLL and DPWLG are deferring any NRA Addendum scoring to others, it does seems contradictory that POTLL and DPWLL comment on the findings of the NRA Addendum. Comments related to increases in consequence scores for the most likely scenario of the NRA Addendum were received for DPWLG after the hazard workshop on Friday 05/04/2019 09:08, and a sensitivity was undertaken on the agreed hazard scores with these numbers and included in the NRA Addendum report issued Friday 05/04/2019 17:00 – however, as the scores derived in the hazard workshop were agreed by all parties the Applicant did not think it appropriate to arbitrarily increase the scores in the hazard log of the NRA Addendum for either the workshop hazard scores (Haz ID 1-4), or the remaining hazards (Haz ID 5-18).

15)	Paragraph 153 of the NRAA acknowledges these concerns, but does not assess in sufficient detail to allow the reader to develop an understanding of the effect on risk scores. For example, increasing the consequence score to “Minor level” only increases the score for collision. It does not increase the score for grounding, which LGPL and POTLL contend should be ‘Moderate’.	As above.

16)	Whilst the NRAA gives more comfort than the NRA with regard to the transit of ships via the inshore route, LGPL and POTLL remain unconvinced by the NRAA with regard to pilot boarding operations. In this regard a full bridge simulation study is considered necessary. It is noted that the NRAA (paragraph 163) has also endorsed such a study, but considers it acceptable to defer its completion until the (post DCO) detailed design stage. We do not agree with this suggestion and believe that the study is required to inform the ExA's consideration of the application for development consent.	The Applicant maintains that the bridge simulation study remains a valid component of the overall assessment and wider consideration of navigational risk and is not diminished by the comments from IP's, which have been addressed elsewhere (see Section 5.3 of Statement of Evidence Appendix 2 at Deadline 4C). Notably the Pilot Transfer Bridge Simulation study was undertaken against a more onerous layout (PIER RLB) and demonstrated that adequate sea room was available for class 1 ships of 240m LOA (which were selected by the PLA, PLA Pilots and ESL ,and which represent only 1% of vessels using the inshore route). Sea room requirements for larger vessels have nevertheless been provided for in the SEZ through adoption of methodological and relevant guidance (and provide for the PLA basis of requests for 2nm plus 1nm) and in particular it should be noted that the pilotage operations have been addressed within these calculations/requests and the hazard workshop and NRA Addendum factor in vessels of this size and operations of this nature. It is important to clarify the basis of the Applicants proposed consideration of simulation – on the basis of the final design and in order to validate and refine risk control measures such as buoys and navigational aids. It is not considered necessary to validate the NRA with a navigation simulation in this way.

17)	Without the necessary adjustments to the NRAA including a pilotage simulation study being carried out, it is not possible for the IPs, the ExA and the Secretary of State to make a reasoned assessment of the navigation risks and economic impacts of the project.	See response to point 16 regarding simulation.
18)	For the reasons outlined, the two Ports are unable to comment fully on the acceptability of the SEZ proposed by the Applicant.	The Applicant has provided a detailed rationale, justification, and detailed explanation of what will be permitted within the SEZ (see comment 4 above). These submissions have been issued for formal consultation with the IPs, and the Applicant welcomes their commentary.
19)	As such, at this stage the impacts of the project cannot be examined fully and therefore the ExA is not yet in a position to assess the effects of the application in accordance with what the National Policy Statement EN-3 requires.	The Applicant is firmly of the view that the assessments provided for (which are in excess of normal guidance requirements) are eminently capable of satisfying both the ExA and IP's on Shipping and Navigation grounds and indeed have provided an exceptional body of evidence to conclude that impacts of the TEOW are neither significant nor onerous. Notwithstanding this, as noted in response to point 18, the Applicant has provided a detailed rationale, justification, and detailed explanation of what will be permitted within the SEZ. These submissions have been issued for formal consultation with the IPs, and the Applicant welcomes their commentary.

20)	Further information in respect of policy considerations is set out in LGPL and POTLL's Deadline 3 submission (REP3-070) in the Planning Policy Position Paper. The two ports note that the Applicant produced "Appendix 5 to the Deadline 4 Submission - Responses to comments on Shipping Policy Considerations" (REP-007) at Deadline 4 in which it commented on the policy position. The two ports do not agree in particular with the Applicant's characterisation of the applicability of NPS EN-3 paragraphs 2.6.161 – 2.6.163. Further submissions will be made on this point if necessary however it is understood that this will be discussed in more detail at ISH8.	The Applicant notes this and will respond to the IPs final position on shipping policy at Deadline 6.