Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

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

Relevant Examination Deadline: 4C

Submitted by Vattenfall Wind Power Ltd

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Revision A

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1 Introduction

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

1.2 Expert Witnesses

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

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

Dr Ed Rogers

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

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

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

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

Jamie Holmes

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

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

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

Captain Simon Moore

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

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

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

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

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

2 Project Status since ISH5

2.1 Structures Exclusion Zone

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

2.2 Further assessment and revised Hazard Logs

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

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

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

3 Baseline Data

3.1 Context

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

Maximum vessel size on inshore route/dipping

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

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

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

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

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

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

3.2 Reliability of Survey Results for Baseline Characterisation

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

Seasonality

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

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

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

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

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

3.3 Future Traffic Profiles

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

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

4 Sea Room

4.1 Summary of current position

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

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

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

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

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

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

4.2 General approach of Applicant

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

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

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

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

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

4.3 Inshore Route

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

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

4.4 Pilotage

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

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

5 Navigation Risk Assessment

5.1 Original RLB NRA

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

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

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

5.2 Consultation

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

PLA / ESL / LPC

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

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

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

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

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

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

MCA / Trinity House

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

POTLL / DPWLG

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

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

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

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

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

5.3 Supporting Studies

Pilot Simulation

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

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

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

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

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

Collision Risk Modelling

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

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

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

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

6 Addendum NRA – Risk Assessment

6.1 Introduction

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

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

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

67 The evidential basis of the assessment was:

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

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

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

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

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

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

6.2 FSA Step 1: Hazard Identification

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

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

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

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

74 The vessel type categories were:

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

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

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

6.3 FSA Step 2: Hazard Scoring

Baseline Risk

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

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

Hazard Scoring

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

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

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

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

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

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

Inherent Risk

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

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

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

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

Residual Risk

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

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

6.4 FSA Step 3: Risk Controls

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

6.5 FSA Step 4: Cost Benefit

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

6.6 FSA Step 5: Results

Baseline Results

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

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

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

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

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

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

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

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

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

Inherent Results

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

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

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

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

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

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

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

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

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

Residual Results

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

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

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

Further Risk Controls

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

Post Consent Monitoring

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

Risk Control Validation

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

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

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

Pilot Boarding

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

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

6.7 Summary

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

7 Other matters

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

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

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

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

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

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

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

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

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

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

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

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

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

8 Conclusions

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