Vattenfall Wind Power Ltd

Thanet Extension Offshore Wind Farm

Appendix 31 to Deadline 1 Submission: Written Summary of Oral Case put at the Issue Specific Hearing 2 – Shipping & Navigation

Relevant Examination Deadline: 1

Submitted by Vattenfall Wind Power Ltd

Date: January 2019

Revision A

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

Revision 0	Circulated to agreed attendees
Revision A	First draft submitted to the Examining Authority
N/A	
N/A	

Contents

1 Introduction

1 This speaking notes summarises the Applicant's case for Shipping and Navigation as presented on 11 and 12 December 2018 at Issue Specific Hearings 1 and 2.

2 The note follows the structure of the Agenda for the Issue Specific Hearings and also includes items discussed at the IS Hearings that were not on the agenda.

1.2 Participants

3 Shipping and Navigation oral representations from the Applicant were made from the following personnel in these Hearings:

- Scott Lyness (Counsel for the Applicant) (ScL)
- Daniel Bates (Consents Manager at Vattenfall) (DB)
- Jamie Holmes (Project Manager at Marico Marine) (JH)
- Dr Ed Rogers (Project Director and Technical Lead at Marico Marine) (ER)
- Captain Simon Moore (Marine Lead, Independent) (SMO)

1.3 Agenda

4 Shipping and Navigation Issue Specific Hearing agenda items were structured as listed below. It is noted that there was considerable overlap between ISH Questions 2 – 6 and thus items in this agenda note are addressed in the order that discussion was held during the Issue Specific Hearing (with expansive points provided where appropriate).

- Issue Specific Hearing 1 – Question 7. Shipping, Navigation and Marine Safety Relating to French Waters
- Issue Specific Hearing 1 – Question 8. Shipping, Navigation and Marine Safety Relating to the Waters of other Countries
- Issue Specific Hearing 2. - Question 2. Effects on Ports, Harbours, Channels and Related Facilities
- Issue Specific Hearing 2. - Question 3. Effects in relation to Shipping Services and Interests
- Issue Specific Hearing 2. - Question 4. Effects in relation to Lights and Navigation
- Issue Specific Hearing 2. – Question 5. Effects in relation to Pilotage
- Issue Specific Hearing 2. – Question 6. Maritime Safety: Working with the Environmental Statement (ES) and the Navigation Risk Assessment (NRA)

2 Issue Specific Hearing 1 – Agenda Item 7. Shipping, Navigation and Marine Safety Relating to French Waters

5 ***The ExA asked whether the Applicant wished to summarise any potential effects in relation to shipping, navigation and marine safety on French waters that emerge as a consequence of the proposed development.***

6 JH explained the position that it is the Applicants position that there are no adverse effects on French practices and to French Waters.

7 JH presented *Figure 11 'Shipping Routes' of the Navigation Risk Assessment Application Ref 6.4.10.1* showing internationally recognised sea lanes in wider context (see NPS EN-3 2.6.155 and 2.6.161), traffic separation schemes and navigation routes and anchorages.

8 JH noted that the project Red Line Boundary is 5nm clear of Traffic Separation Schemes and internationally recognised sea lanes and is also outside of the CALDOVREP IMO Mandatory reporting area and Channel Navigation Information Service (operated by Maritime Rescue Co-ordination Centre in Dover and CROSSS Gris Nez in France).

9 The proposed extension is within 12 nm of the UK coast and a further 13 nm from the UK/ France marine border. Whilst shipping is a multinational industry with vessels of many nationalities transiting past the area of the proposed extension, they abide by international regulations and when in territorial or port waters, by local regulations. These impacts are therefore inherently included within the overall shipping and navigation assessment *(Ref Paragraph 10.17 of Volume 2, Chapter 10 (Application Ref 6.2.10) of the Environmental Statement).*

10 The study area extends to 5nm beyond the Red Line Boundary. The vessel traffic survey data (in accordance with MGN543) obtained within this study area is a key component of the assessment and inherently includes traffic departing to and arriving from international destinations.

11 In terms of re-routing specifically, it should be noted that whilst the project may result in some minor change in distance travelled of vessels in association with displacement by the scheme this is not considered significant in the context of overall journey route distances For example, the greatest magnitude of route diversion is 3nm which is traffic transiting east/west to the south of the Extension. This is minor in proportion of increased distance on the overall route (for example Zeebrugge to Tilbury which is a transit of circa 200nm relates to a percentage difference of 1 - 1.5%) and equivalent or less than increases that may typically be experienced as part of normal navigation such as avoidance of other obstructions, traffic or weather avoidance or time on station adjustments to allow for pre-planned arrival/departure time/locations. The project does not affect access of vessels to wider navigation routes or Traffic Separation Schemes.

12 ***The ExA asked the Applicant to confirm whether they agreed with the MCA's description of how the Traffic Separation Scheme operates.***

13 ER noted the importance of terminology and definition around traffic separation, sea lanes, channels and routes. ER confirmed that the risk assessment inherently includes these measures and as they relate to shipping, navigation and maritime safety. A description of Traffic Separation Schemes is provided within *Section 3.4.4 of the Navigation Risk Assessment Application Ref 6.4.10.1* and it is noted that the project boundary is 5nm clear of the TSS (at the closest point of the south eastern corner) and is not impacted by the extension.

14 It was noted that MCA have taken an action, ahead of Deadline 1, to provide a summary statement of oral submissions on the implications of the proposed development for international shipping in French waters, which may be drawn to the attention of the French Government.

15 It should be noted that the consultation response by DIRM Manche EST- Mer du Nord by email on 10-October-2018 does not indicate shipping and navigation concerns from French authorities.

3 Issue Specific Hearing 1 - Agenda Item 8. Shipping, Navigation and Marine Safety Relating to the Waters of other Countries

16 It was noted by the ExA that there were no persons in attendance representing the interests of the waters of other countries.

4 Issue Specific Hearing 2. - Agenda Item 2. Effects on Ports, Harbours, Channels and Related Facilities.

17 Following input from IPs ***the ExA asked the Applicant to respond with respect of the points raised.*** ScL, on behalf of the Applicant, identified that responses to IPs overall position would be dealt with where appropriate in an 'agenda item by agenda item' sequence, recognising that it would be difficult to avoid overlap completely. In response to IP representations ScL initially noted that the Applicant fundamentally disagreed that the western area of sea would become "redundant" to current vessel movements; and confirmed that the IPs consulted had not provided any detailed evidence to dispute the assessment carried out by the Applicant, or to provide any evidence-based correlation for a suggested reduction in the RLB. Technical advisers ER, JH, and SMO then discussed a number of points through reference to the ExA 'sea zones'.

18 Initial factual inaccuracies raised by LG and PoT were responded to by ER and SMO. ER noted individual pilot stations, clarifying where exactly locations of the NE Spit station, Tongue, and, to the south, the North East Goodwin pilot boarding station. SMO noted where the Sunk Pilot station (SUNK) is located, to the North.

19 It should be noted that this information is further provided in *Figure 9 Location of Harbour Limits and Pilot Stations of the Navigation Risk Assessment Application Ref 6.4.10.1* albeit SUNK is not shown at this scale. SUNK is utilised significantly by deep draught traffic entering the Black Deep and Knock John channels albeit data on its usage relative to the other Pilot Boarding Stations was not available.

20 ER noted that the NE Goodwin and Tongue are very infrequently used in the data that the project utilised.

21 ER noted that neither the Princes Channel nor Fishermans Gat would be subject to closure as asserted as navigation in the approaches is not affected or limited by the project (noting that Fishermans Gat and Princes Channel are currently both narrower and the same depth, or shallower, than the critical depths as stated for NE Spit Pilots by the PLA). **The ExA referred further to the inshore route,** including the lead up to the Princes Channel.

22 In response to IPs and ExA, SMO responded with regards to the use of the inshore route and sea room requirements by the prudent mariner. ***The ExA noted, with reference to Figure 46, the variance in 'setback' distances of routes and asked setbacks utilised by prudent mariners in the area and specifically to the east*** *in relation to 'Figure 46 Main Shipping Routes' of the Navigation Risk Assessment Application Ref 6.4.10.1'.* SMO responded noting that all traffic is clearly following or governed by the buoyage. This also follows the guidance to mariners – admiralty routing directions giving a paragraph by paragraph, buoy by buoy set of guidance. Vessels are clearly routing by buoys, termed buoy hopping, from the SE quadrant through to the NW quadrant and whilst in these sectors, clearances from the wind farm are up to 3nm, this is because they are routing using the buoyage to the west (from Elbow buoy through to the Pilot Station and E Margate buoy as this is efficient routing (shortest and quickest route) whilst maintaining sufficient under keel clearance (UKC)). It is also noted that this buoyage is presently placed (conservatively) circa 1nm from the 10 meter depth contour, in relation to which it is located. There is no pre-determined distance being maintained from a feature; in some areas the distance is 2-3nm (as in the SW Sea Zone Sector) in others 400-500m (e.g. in the NW and NE and SE Sea Zone Sectors). The prudent mariner simply follows a clearance based on their comfort factor developed through consideration of parameters including the ship and the conditions. ***The ExA asked whether development out to the RLB would materially drive this traffic further west.*** SMO responded that there would remain sufficient sea room for transiting vessels with adequate buffers from features and also for passing other vessels. SMO commented that in general the prudent mariner would look to be 0.5nm (5 cables) from a feature, furthermore parallel indexing would be employed by vessel masters to manage the distance from the proposed array, using it as a clear point of reference from which a safety distance is established and monitored. SMO further noted that the majority of traffic using this area is of a deeper draught and indeed noted the PLA Pilotage Directions clarifies traffic of greater than 7.5m draught that cannot safely transit using the Princes Channel or Fisherman's Gat should route via the SUNK. SMO expressed the view that the proposed scheme with the current red line boundary would not therefore affect the ability of vessels to use this route, as they would tend to navigate further to the west in any event.

23 ***The ExA requested clarification on AIS tracks at the Goodwin Pilot Station on pilot transfer and converging with through traffic.*** ER confirmed that there were no pilot boardings at the Goodwin pilot station during the data period and all traffic in this area of the Sea Zones Plan is therefore 'through traffic'.

24 SMO referred back to ESL that Goodwin has been brought in to accommodate larger vessels instead of the SUNK but is not currently frequently used.

25 SMO further noted that anchorages frequently utilise Margate Sands as an area to ride out storms, with up to 20 vessels within the area, manoeuvring well within 0.5nm of one another, but even at this density there is still no impingement on sea room and/or the pilot station.

26 Anchorages within the study area are explained in more detail in *Section 3.6.6 of the Navigation Risk Assessment Application Ref 6.4.10.1* and *Ref Paragraph 10.34 of Volume 2, Chapter 10 (Application Ref 6.2.10) of the Environmental Statement*. An overview is given below together with *Figure 13 of the Navigation Risk Assessment Application Ref 6.4.10.1*). It was noted by SMO that vessels frequently elect to navigate within and in close proximity to anchorage areas and frequently vessels will pass within 2 cables when manoeuvring past one and other in and out of the anchorage in busy periods.

- Margate Roads (with typically between 2-5 at anchor and up to 20 in poor weather – providing shelter from southerly winds). Admiralty sailing directions require vessels to anchor as far west as draft will permit (although commentary that vessels spread to the east is noted) and certainly no further than the line marked on admiralty charts between E Margate and Elbow buoys. It should be noted that the project reduction in the RLB provided an increase in the East – West sea room through this area.
- Tongue Deep Water which is used less frequently.

27 In response to **an ExA inquiry regarding *the number and size of vessels using the western area, interactions*** and the suggestion by IPs that vessels would have to navigate through extensive traffic, JH referred to the route map as presented in the NRA *'Figure 46 Main Shipping Routes' of the Navigation Risk Assessment Application Ref 6.4.10.1'*. AIS data has been analysed to identify routes. JH noted these are not formalised navigational channels. An accompanying table *(Table 10)* from the NRA further clarifies these tracks in relation to *Figure 46* and clearly shows the routes that are generally taken as presented in the hearing.

28 It is useful to clarify three relevant features:

- Sea Lanes and TSS – Internationally designated lanes and Traffic Separation Schemes of SUNK and the Dover Straits are shown in the blue bounded areas – there are routing measures governing the transit of vessels and adopted by IMO (see Figure 11 of the Navigation Risk Assessment Application Ref 6.4.10.1)
- Designated Navigation Channels, designated, buoyed and marked accordingly are all outside the study area and are not affected by the Extension. These are best illustrated

by *Figure 9 Location of Harbour Limits and Pilot Stations of the Navigation Risk Assessment Application Ref 6.4.10.1.*

  - Princes Channel to the West North West (outside study area circa 8.5nm from RLB)
  - Fisherman's Gat to the North West (outside study area circa 8.5nm from RLB)

- Routes – (shaded blue/orange on Figure 11 and subsequently broken down further in Figure 46 and Table 11 within Section 7.1.2) Routing is determined from the collected data and is based on a review of the density and distribution of traffic transiting through an area – with a judgment that is area specific taken on a sufficient number of transits to determine a route.

29 For this project, areas with more than circa 2 transits per 24 hour period were considered as a threshold for classification as a route (this excluded service vessels such as wind farm and pilot launch cutters). This could be considered a precautionary and proportionate approach with a low threshold.

30 Noteworthy, and with reference to *Figure 46 and Table 11 of the Navigation Risk Assessment Application Ref 6.4.10.1,* is Route 4 (Princes Channel to English Channel) in relation to concerns on routing through existing areas of navigation (principally relating to the reduction in sea room to the west) for traffic inbound/outbound to ports and harbours and the perception that this traffic may be re-routed. Route 4 is limited by depth which places a naturally driven limitation on the size of vessels (specifically by draught) using this route. (Ref Section 7.1.3 *of the Navigation Risk Assessment Application Ref 6.4.10.1*). This route equates to approximately 10 vessels per 24 hour period.

31 SMO then noted that 10 vessels per hour is a daily occurrence for a vessel master, all manner of vessels being present using the International Regulations for the Preventing of Collisions at Sea (IRPCS) which are published by the International Maritime Organisation. (IMO). These set out the "rules of the road" or navigation rules to be followed by ships and other vessels to prevent collisions. They define responsibilities between vessels such as a power driven vessel should give way to a sailing vessel but also importantly define that when a vessel required to give way and does not and a collision is imminent the other vessel should take avoiding action also. It is important to note that any advice the Master receives from a pilot boat coxswain with regards to manoeuvring his ship to create a lee is only advice. The Master will only complete the requested manoeuvre only if it is safe to so and the safety of the vessel at all times rest with the Master.

32 JH then discussed sizes and distributions of vessels with reference to *Figure 33 of the Navigation Risk Assessment Application Ref 6.4.10.1* showing a gate – a linear cross section of traffic flow at any point measuring frequency and distribution by direction. It should be noted that Gate A (and E) shows that the majority of the through traffic here is clear of the proposed extension (and demonstrates route 4 of circa 10 per 24 hour period and the generally low volumes of traffic transiting through the inshore area – for example in comparison to Gate C). JH provided further information on the nature of routeing of vessels in this area in response to a later question.

33 ***The ExA asked why there were no gates chosen in the NW corner***. ER explained that Gate C and E capture this information between them (but that gates can be undertaken at anywhere as required to analyse traffic accordingly). ***The ExA further clarified that traffic appeared to be dipping down and asked for explanation on this.*** ER clarified that much of this activity reflects vessels deviating in order to pick up or disembark a pilot. It should be noted that Gate E shows approximately 25 transits per day and a wider geographic spread albeit this includes vessels accessing Margate Roads anchorage (particularly at the western end) and those dipping down to NE Spit to embark or disembark a Pilot where they might otherwise elect to undertake this at Tongue with less deviation from their route.

34 Further to submissions made by London Gateway and Port of Tilbury regarding future traffic and ***queries raised by the ExA (see further below)*** the Applicant wishes to note the approach taken to traffic forecast projections.

35 It should be noted that traffic forecasts in the Ports NPS were presented in 2006-07 and, as the NPS states, there was a 'severe downturn' since these were published (Section 3.4.4). New forecasts have not been updated into the NPS and so, on this basis, the NPS also recognises rates are difficult to predict and influenced by geography and trade. It states ports should undertake their own review of traffic forecasts (Section 3.4.7) and it is noted that PLA, PoT and London Gateway have been requested to provide further information on forecasts prior to Deadline 1.

36 It should also be noted that the Applicant has considered future traffic profiles within the NRA, which utilised data and trends from 2000 – 2016 *(Ref Section 6 of the Navigation Risk Assessment Application Ref 6.4.10.1*). This was also related to more localised predictions (Section 6.2) and future forecasts to the PLA Thames Vision Project which forecasts trade growth to 2035. Inter-port trade is forecast to increase from 45m tonnes to between 56-93 million tonnes per year.

37 The Applicant anticipates that further information on traffic forecasts will be placed before the examination but in general terms it is noted at this stage that an increase in volume of trade does not correlate to mean more ships and indeed the trend towards larger (deeper draft) vessels servicing these ports (e.g. London Gateway) is likely to result in fewer vessels using the western side of the extension (aka Route 4) and entering the Thames using SUNK via Black Deep in accordance with Pilotage Directions.

38 In response to points raised during this section of the hearing, the Applicant understands the following actions to have been identified.

39 **Action:** Applicant to produce a wider area plan showing outer Thames estuary and approaches to Port of London.

40 **Action:** Applicant to produce plan of pilot boarding areas (in SUNK) as a wider scale view of Figure 9.

41 **Action:** PLA, Port of Tilbury and LG to produce a tabulated submission showing current traffic and forecasts over the life of Thanet Extension.

42 **Action:** LG to produce quantification of additional steaming time on existing and predicted traffic forecasts.

43 **Action:** PoT to demonstrate how Thanet Extension was considered within the Tilbury 2 EIA, in particular whether it was identified as a constraint to the future development of Tilbury.

5 Issue Specific Hearing 2. - Agenda Item 3. Effects in relation to Shipping Services and Interests

44 JH responded to questions from the IPs on data sources used to support the studies.

45 JH clarified that data was collected in accordance with MGN 543 with two vessel traffic surveys (07 – 25-Feb and 15 – 29 Jun 2017) to provide seasonal representation and using Radar, AIS and visual identification techniques were utilised as described in *Section 5.1 of the Navigation Risk Assessment Application Ref 6.4.10.1*. JH made reference to *Figure 10.3 of Volume 2, Chapter 10 (Application Ref 6.2.10) of the Environmental Statement* as an overview of all recorded vessel traffic from this survey. Further analysis of this data was undertaken which has underpinned the assessment.

46 JH also noted that, in addition, and to provide a dataset in advance of the vessel traffic survey data being available to the project, 3 months of AIS data (between 01 December 2016 and 28 February 2017) was provided to Marico Marine by Vattenfall and utilised in order to support and supplement early work into pilotage although the subsequent analysis for the risk assessment is fundamentally underpinned by the vessel traffic survey data in accordance with the minimum requirements of MGN543 and supplemented by this additional data.

47 ***ExA requested clarification on where this data has been used*** and JH explained the 3 months of AIS data was used for the pilotage study and pilotage bridge navigation simulation report and where this data is referenced and repeated within the Navigation Risk Assessment this is made clear within the relevant section, plot or analysis.

48 ScL explained the Applicant's view that the data collected used is compliant in accordance with MGN543 (and indeed the NRA has also been undertaken in compliance with MGN 543) and has been agreed as acceptable by the MCA. There has been no detailed dispute with the methodology adopted including the collection of data.

49 ***The ExA queried Figure 10.9 with regards to interactions of vessel traffic that included recreational vessels*** and JH confirmed this plot shows recreational tracks from the 14-day summer and 14-day winter surveys derived from a composite of AIS, radar tracks and visual. JH noted that capturing some vessel traffic types under AIS transmission alone (e.g. recreational and fishing) can be more challenging due to small commercial vessels and recreational craft not being mandated to carry AIS under SOLAS V requirements and therefore this is the reasons MGN543 requires surveys to utilise visual and radar methods in addition to AIS.

50 Discussions were held recognising that activity levels of vessel types (e.g. recreation and fishing) varies throughout the year due to different drivers. For example, spatial and temporal fishing activity will vary by seasons, quotas, species bans and species catch variances; and recreational traffic may be influenced by holiday seasons, weather and events. MGN543 requires a seasonal split of the vessel traffic survey data to provide an indication of variance, but does not require a full year survey.

51 ***The ExA queried effects of controls, specifically that usage of relocating boarding from NE Spit to the Tongue would reduce risk by 23%.*** ER explained that this scenario was tested in the collision risk modelling (as per *Section 7.3.2 of the Navigation Risk Assessment Application Ref 6.4.10.1)* but was not taken forward as a mitigation measure as, together with the findings from the bridge navigation simulation which demonstrated that transfer remain feasible at NE Spit, it did not meet the requirements of ALARP and, ***following a query from the ExA,*** would involve a reduction in risk from scheme constructed rather than a reduction in the underlying baseline risk.

52 ER clarified that the collision risk modelling allows a benchmarking of risk change and, ***as queried by the ExA,*** the full range of possible risk controls were not tested within the modelling although it is noted that the RLB change was an embedded risk control as this was the simplest way of incorporating that change made following PEIR into the NRA. Boundary change in and of itself is not necessarily considered to be 'mitigation'.

53 ***The ExA noted that where mitigations are being relied upon the expectation is that the Applicant to use the DCO and DML to secure the mitigations and this therefore needs to be clear***. ScL clarified there are there are three categories of risk controls:

- Embedded risk controls – those assumed to be in place for the inherent risk assessment (*Table 20 of the Navigation Risk Assessment Application Ref 6.4.10.1)*
- Additional Risk Controls - to provide residual risk assessment (*Table 21 of the Navigation Risk Assessment Application Ref 6.4.10.1)*
- Additional Risk Controls considered and not taken forwards (this includes the relocation of the Pilot Boarding Station) (*Table 22 of the Navigation Risk Assessment Application Ref 6.4.10.1)*

54 ScL confirmed that Embedded and Additional Risk Controls that are within the DCO will be made clear by Deadline 1.

55 ***The ExA requested clarification on Table 12 Figure 10.8.*** ScL stated that it would be worth providing further context and methodology around the 1 in 4.5 year figure relating to collision risk and it was agreed to defer this to Question 6.

56 ScL asked JH to provide some further explanation and context around the comments on routing and displacement. JH explained, with reference to *Section 7.1.2* and specifically with *Figure 46 and Table 10 of the Navigation Risk Assessment Application Ref 6.4.10.1* – this shows the delta in route diversion (with the applied 0.5nm buffer) in columns 4 and 5 showing the existing and post extension scenarios. This is expressed for the six identified routes within the local study area (i.e. the 5nm buffer to the boundary.

57 The greatest diversion of 3nm is for route 5 which, it should be noted, is the least utilised route of vessels transiting east/west to the south to the Extension at circa 2 per day. JH emphasised the distance of diversion is shown relative to the local study area whilst the overall proportion of increased distance on the overall route will be minimal (for example Zeebrugge to Tilbury which is a transit of circa 200nm relates to a percentage difference of 1 - 1.5%). It is also noted that other factors of a vessel voyage may cause increases of equivalent or greater magnitude as part of normal navigation (which may include avoidance of other obstructions, traffic or weather avoidance or time on station adjustments to allow for pre-planned arrival/departure time/locations).

58 In addition, the Applicant also notes the most onerous scenario where a vessel might determine to not transit to the west of the extension (i.e. route 4), and instead elect to transit round the east/north then the increase in distance would be 11nm from 14nm to 25nm (not an increase of 25nm as stated by a number of Interested Parties within Question 2). Furthermore, whilst this was calculated for completeness within the assessment it is the Applicant's view that this alternative transit is not a requirement as Route 4 remains navigable, for reasons explained at the ISH and in the NRA.

59 With reference to earlier discussion on identified routes, further analysis can be highlighted on the relationship between these routes and the density and mix of vessels, in particular by number and size, specifically by length and draft.

60 JH explained *Figure 36 of the Navigation Risk Assessment Application Ref 6.4.10.1* – showing the distribution of vessels at the gates (from Figure 33) by vessel length. Both gate A and E demonstrate that over 95% of vessels passing through this area are less than 200m in length. ***The ExA noted this and confirming this aligns with the observed draught limitations of the western area.*** JH noted that when considering the number and size of the vessels in this area, this information did not suggest that the proposals would cause an underlying navigational safety concern that would render the route redundant.

61 ***ExA strongly emphasised the importance of engagement with all relevant parties with emergence of forecasts on shipping type mix, utilisation of routes. The ExA need to consider the consequences across these factors and the potential effect on individual routes. This is particularly important as the global forecast of vessels and their given tonnage, meterage or draft, it is clear vessels are becoming longer and larger. Disentangling congestion, safety and commercial issues arising from the effects of Project and those arising from an evolving change in shipping mix will be challenging.***

62 In response to a comment by ScL that the PLA had not suggested any specific criticism of the NRA, the PLA commented that the draft NRA report was not viewed prior to submission. RO noted that this was also the case for PoT and LGW. ScL stated that the extensive consultation with the PLA and others including ESL, before and during the preparation of the NRA, was set out in Table 8 of the NRA. This consultation included presentation and discussion of early findings.

63 In response to a query by the Port of Tilbury and London Gateway, ScL and DB clarified that the red line boundary refers to the maximum envelope boundary of development and does not necessarily assume the provision within that boundary of exclusion or safety zones. However, the final number and precise location of turbines has not yet been finally determined and the draft DCO makes specific provision for these details to be settled by way of a design plan agreed in writing with the MMO and in consultation with Trinity House and the MCA, showing the proposed location and choice of all turbines, along with rotor diameter and spacing.

64 It is not necessary for the safety zones to be specified within the DCO. There will be a separate safety zone application to the Secretary of State for Business, Energy and Industrial Strategy in accordance with section 95 of the Energy Act 2004. providing all the necessary information, once the details have been finalised. The application will be for "standard" rolling safety zones of 500 metres around each OREI for the period of construction (and during exceptional or major maintenance activities), in order to ensure the safety of the windfarm infrastructure, construction vessels and other vessels navigating in the area whilst works take place (though in practice the prudent mariner would maintain such a distance from other vessels as part of standard operations). The application may also be for a 50 metre safety zone around each of the OREI within the project area during the operational phase, to ensure the safety of operation and maintenance vessels and other vessels navigating in the area. This exclusion zone would not extend beyond the project boundary as all equipment including turbine blades must be within the order limits and the blades will be greater than 50m in length.

65 a realistic worst case that turbines could be placed up to the red line boundary, which for the reasons given throughout the assessment would be acceptable.

66 In response to points raised during this section of the hearing, the Applicant understands the following actions to have been identified.

67 **Action:** Clarify the 23% and risk controls/sensitivity and RLB assumptions around the collision risk modelling including Table 12. Also note the scenario with regards to inclusion of WFSV's representing a further 9% increase on the 54% increase.

68 **Action:** Clarify DCO content relating to embedded and additional risk controls to be included in the draft DCO and to be provided by Deadline 1. To be considered as a navigation management plan of obligations.

69 **Action:** Provide note at Deadline 1 to clarify exclusion/safety zones and order limits.

6 Issue Specific Hearing 2. - Agenda Item 4. Effects in relation to Lights and Navigation

70 ***The ExA requested details on the co-operation plan from the meeting of 10 January 2018*** (meeting attended by MCA, Trinity House, Vattenfall and Marico Marine). JH explained that further detail is provided on this within Table 21 (Risk Control No. 4) of the Navigation Risk Assessment Application Ref 6.4.10.1 and that further detail can be provided. It is also noted that this topic has emerged as an ExA question and is therefore addressed in answer to that question at Deadline 1.

71 ***The ExA asked the Applicant to respond to the discussion, and comments by Trinity House, regarding mitigations during construction, particularly surrounding risk controls of communication and information dissemination.*** ScL noted that in the draft DCO a Notice to Mariners (and regular updates) are included as a provision in the Deemed Marine Licence (see Schedule 11, Condition 6) and aids to navigation are to be implemented under the direction of Trinity House (see Schedule 11, Condition 7). ScL asked SMO to comment on the aspects of qualitative assessment and JH to comment on radar interference.

72 Following the concerns of Trinity House raised regarding the standards of bridge teams in today's world and general competence SMO informed the hearing that all commercial vessels are registered to a country which is known as the flag state. A flag state will require the ship owner to have an International Safety Management System in place (ISM) which is approved by the flag state. This on board safety management system will detail the requirements of how the vessel should be operated. Crucially, the flag state will audit the company and the ship at least once annually to ensure that it complies with its own safety management system. The company is also obliged to audit the ship at least once per annum and the Master is required to review the safety management system annually also.

73 SMO shared and understood RB's general comment regarding competence of the modern day Master and Navigator specifically with regards to over reliance of electronic navigation however there is no specific evidence regarding competence on ships frequenting the NE Spit pilot station.

74 SMO challenged the quoted figure of just 2 miles sea room being available in the area to the west of the wind farm. There is 2nm from the RLB to the NE Spit pilot station however there is further sea room the north and south of the pilot station and a further 2nm to the west of the pilot station (noting this area is periodically occupied by anchoring vessels). The total distance from the North Foreland across to the closest point of the RLB is in the region of 4.5 nm and in water of a greater depth of 10m chart datum is 3.5 miles. SMO challenged the view that the sea room was too tight, explaining this is a coastal navigation area and because of that vessels do naturally pass closer to one another. This also needs to be put into context whereby two vessels approaching one another one from the north and one from the south on reciprocal headings both give way to starboard in accordance with the IRPCS and pass at 0.5nm which is acceptable. However, this range would increase for a passing ahead vessel. The majority of the vessels in the area to the west of the windfarm are transiting through the area and the simplest course of action would be to give way to one another.

75 JH explained, in response to Trinity House comments, a summary of the work undertaken by Marico Marine in reviewing impact on communications, radar and positioning systems. *Section 7.9 of the Navigation Risk Assessment Application Ref 6.4.10.1* provides further detail. JH explained that affects are recognised in the industry and broadly well understood. Reference was made to industry publications and trials at North Hoyle, Kentish Flats and Thornton Bank. The latter two of these studies involved Marico Marine (the Kentish Flats study in 2006/2007 was developing on the 2004 North Hoyle work which had been undertaken by the MCA and QinetiQ). The Thornton Bank trials were used to review and update the Kentish Flats study for larger WTG's (6MW). In general, the conclusions of the first two studies were that effects were not 'significant enough to either raise concern for navigational safety nor inhibit vessels tracking one another' and that 'navigators are able to effectively track other vessels from both within and behind the area of the wind farm' and 'small craft were detectable except when in very close proximity to a turbine'. The Thornton Bank trials demonstrated that larger WTGs are clearer and distort targets less as well as reduce reflections.

76 JH noted that the project has the benefit of the existing Thanet wind farm (and others) in the Thames estuary which have familiarised operators and no evidence has been made available to suggest extant issues. The Applicant concluded that the extension of the wind farm will not adversely affect the use of radar for collision avoidance and therefore assessed impacts as likely and negligible and minor in significance.

77 The Applicant understands that the following action was agreed in response to discussions during this aspect of the hearing.

78 ***Action:*** *Produce further detail of Co-ordination plan*

7 Issue Specific Hearing 2. – Agenda Item 5. Effects in relation to Pilotage

79 ***Following an invitation by ExA,*** SMO responded to comments raised by London Pilots Association on restriction on navigable areas available and depth of water available for pilot operations.

80 SMO noted the existing limitations of the area to the west of the extension, specifically with regard to the draught of vessels using this area and depth of water. SMO also noted that vessels constrained by draught and underway are able to display shapes to alert other vessels to this constraint. SMO noted that vessels of greater than 7.5m draught or greater are currently reliant on height of tide to achieve the required underkeel clearance in order to transit through this area and into the Princes Channel (and this is a normal practice).

81 SMO highlighted the circa 2nm radius of available sea room around the NE Spit Pilot diamond. ScL asked SMO, in response to comments made by IPs, to comment on the narrowest point to the north and the sea room, having regard to the comparatively low number of vessels transiting through this area which is an important context. ***ExA asked for Figure 52 of the Navigation Risk Assessment Application Ref 6.4.10.1. and noted the relationship between sea room at this point relative to the 2nm radius of sea room around the diamond****.* It should be noted that Figure 52 illustrates this comparatively narrower point where sea room had reduced by 1nm to 3.3nm width. Whilst London Pilots Council indicated a worst case scenario of circa 1nm sea room between NE Spit buoy and the RLB, this is not the case and, in any event, it should be noted that whilst a conservative western extent of vessel traffic in Figure 52 was adopted the vessel traffic data shows the vessels navigate as far west as E Margate buoy (which has 4nm of sea room up to the RLB) because the majority of vessels are not constrained by the draught between E Margate and NE Spit buoys (any more than they are through navigating into Fisherman's Gats and/or Princes Channel). A second narrower point, south of the NE Pilot Diamond is noted, with a lateral distance of circa 2nm between Elbow (noting this is conservatively placed and many vessels elect to transit to the West of this Easterly cardinal) and the wind farm. London Pilots Council commented Elbow buoy may require relocation and whilst the Applicant notes it could be repositioned less conservatively it is not considered necessary due to the 2nm of sea room here and that most traffic is transiting through rather than manoeuvring.

82 Noting comments made by London Pilots Council on Tongue, the Applicant does not consider that Tongue Pilot Station require relocation. Drill Stone Buoy (to the east) is identified as requiring relocation which has been addressed with Trinity House previously.

83 ***The ExA asked whether analysis can be undertaken by draught*** and JH responded that the AIS data can be interrogated by draught although it is noted that not all vessels will correctly report their draught as this a variable parameter (e.g. ships may de-ballast prior to a port entry) (*Figure 32 of the Navigation Risk Assessment Application Ref 6.4.10.1)..*

84 ***The ExA questioned Figure 52 and what can be considered as the sea room at this narrowest point.*** Discussion was held to clarify the available width at this point which SMO confirmed as a change from 4.3nm (existing) to 3.3nm (revised RLB). The Applicant notes that a precautionary approach was taken to defining the western limit of this measurement based on the most westerly transit of a vessel with >200m LOA transit and therefore, depending on height of tide, metocean conditions and the specific vessel there can often be additional searoom. London Pilot Association noted that when applying 0.5nm buffer at this point this reduces width and indicated they consider a worst-case scenario of circa 1nm sea room between NE Spit buoy and the RLB. This is not the case and, in any event, it should be noted that whilst the precautionary western extent of vessel traffic in Figure 52 was adopted, the vessel traffic data shows the vessels navigate as far west as E Margate buoy (which has 4nm of lateral sea room up to the RLB) because the majority of vessels are not constrained by the draught between E Margate and NE Spit buoys (any more than they are through navigating into Fisherman's Gats and/or Princes Channel). ***ExA queried what can be considered as the effective sea room in this point*** and SMO noted that whilst this was a more restricted area *narrower* the density of traffic is very low.

85 ***The ExA requested the Applicant and the IP's to develop Figure 52 further to demonstrate the understood sea room at this point (and variance due to various tidal levels and vessels) with a conservative 1.5m Under Keel Clearance*** *(as expressed by London Pilots Association)* ***and the various exclusion/safety zones that should be considered.***

86 ***The ExA also noted the requirement to consider sea room requirements in the context of:***

- ***sea room required for through traffic***
- ***sea room required for pilot transfer (noting the practice of dipping down)***

87 SMO responded to comments made by PLA on additional time required for pilotage due to weather and it is noted the relationship between weather restrictions causing SUNK, Tongue, NE Spit and/or NE Goodwin to go off station is not fundamentally altered. T**he ExA identified the requirement to differentiate between existing weather limitations and what operational changes would be specifically caused by the proposed project and the financial implications of this.**

88 JH outlined the Pilotage Study and, in particular the Pilot Bridge Simulation that were used to qualitatively and quantitively support the navigation risk assessment and were also contributory studies into the red line boundary change. Ref: *Pilot Transfer Bridge Simulation Ref 6.4.10.2*

89 The Pilotage study was undertaken at a very early stage, recognising the nature of feedback raised by ESL and PLA from the Scoping Opinion (including a meeting between Marico Marine and PLA in April 2017) and in order to better understand pilotage operations and the nature of the concerns raised. This included analysis of the three month AIS dataset and two further meetings with PLA and ESL in July and August 2017 following preparation of a short report. Pilot bridge simulation was proposed at the July meeting and further structured at the August meeting to determine whether pilot transfer operations could continue to be feasible at NE Spit with the extended wind farm and specifically to interrogate sea room required for pilot transfers at NE Spit in relation to the narrower point as per *Figure 52 of the Navigation Risk Assessment Application Ref 6.4.10.1.* and the larger area of sea room in the vicinity of the Pilot Diamond to the south.

90 It was felt very important to involve the stakeholders – and PLA and ESL were embedded into this practical work in order to provide best opportunity to elicit the issues raised. It was decided, in agreement with PLA and ESL to utilise the PLA simulator as it is owned and managed by the PLA and it presented other benefits such as location, simulator familiarity (and acceptance). PLA nominated Pilots to attend and participate and ESL nominated Launch Coxswains. The PLA simulator is a proven simulator used routinely by the PLA as a training tool within the PLA SHA areas and is considered adequate for the purposes of this assessment.

91 A setup day was held with ESL and the PLA Pilots in order to setup and familiarise those with the simulator and also agree credible inputs (e.g. vessels, met-ocean conditions) a run plan and also the grading criteria by which each run would be judged (these grading criteria were structured around a successful/marginal/fail criteria and referenced in risk assessment hazard terms (e.g. contact, collision and grounding). Each run was graded on its completion in a group discussion exercise, using run plot outputs to help facilitated.

92 JH explained simulations were undertaken over 2 days with 14 runs undertaken involving up to 4 transfers from one launch. 13 runs were successful and with one marginal from this theme which was due to reasons other than Thanet Extension. The marginal run (Run No. 4) was based on a narrow breach of the proximity criteria (5 cables / 1000 yards) to an anchored ship, although it is important to note that the vessel had completed its pilot transfer and the CPA occurred as it was completing its turn to a northerly heading to begin its entry passage. It was, therefore, demonstrably not as a result of the proposed project and was agreed as such with the participants.

93 On completion of each run a "hot debrief" was held to discuss the conduct of each run, record all the salient points and observations of all parties and assess against the grading criteria. This was a structured 'washup' providing all simulation participants with opportunity to contribute and comment, at that time, on the detail of runs and validity of the simulator and methodological approach. The hot debriefs were also used to review the proposed runs and parameters with amendments being made to include additional runs and/or address specific scenarios of interest based on the emerging themes and learnings.

94 On completion of the simulation runs, time was incorporated into the schedule for a comprehensive debrief, involving all participants, in which the overall exercise was reviewed. The results of each run were reviewed in a reflective context with opportunity to comment on any aspect of the exercise and revisit scorings if necessary. Agreement on the overall results was recorded within *Section 6 of Pilot Transfer Bridge Simulation Ref 6.4.10.2*.

95 The debrief then extended to record recommendations to ensure that all aspects of concern and potential risk control mitigation measures were identified and recorded (Section 8) so that they could be considered and taken forward in the subsequent assessment. These measures were themed as co-ordination/situational awareness, training, regulatory/geographical. It was noted that 'some risk controls were identified to reduce risk that should be considered with or without Thanet extension' *Ref Paragraph 10.11.23 of Volume 2, Chapter 10 (Application Ref 6.2.10) of the Environmental Statement*.

96 The Applicant considers that this simulation was robust, collaborative and based on best practice, using facilities that are designed for the examination and training of pilots and mariners within the Thames Estuary.

97 The study concluded a number of key results and conclusions which were recorded *(Section 6 and Section 7)* including those below which are repeated as they relate to points raised by Interested Parties at the Issue Specific Hearing:

- The simulations were realistic enough to enable meaningful conclusions to be drawn with regard to navigation and pilot transfers in the vicinity of North East Spit Station
- A range of operational scenarios were simulated, including typical profiles of commercial, recreational and fishing vessels in the area – anchored and underway. Within the limits of the simulation these were assessed not to significantly impact on the operation of the North East Spit Station
- The simulations demonstrated that Pilot transfer operations continue to be feasible at North East Spit Station across the full range of operational conditions even with the reduced navigable sea room caused by the extended wind farm layout;

98 The draft report was issued to all participants and comments invited.

99 JH noted that no written response/commentary was received on the draft reports and subsequent consultation meetings were held with PLA and ESL (as part of the NRA) at which no specific feedback on the validity of the simulation methodology was provided (minutes of these meetings held on 05 and 06 December 2017 are provided within *Annex C Navigation Risk Assessment Application Ref 6.4.10.1)*.

100 It should be emphasised that the simulation was undertaken on the old RLB (and hence is precautionary) and also prior to the risk assessment. JH also noted that some transfers were spatially spread to make best available use of the sea room around the NE Spit Pilot Diamond). Furthermore, the transfers undertaken were made more onerous than in reality by

101 ***The ExA asked questions on the 'real world' aspects of the simulator, for example including metocean conditions.*** JH noted that simulation is a tool and a proven worldwide recognised methodology for design and operation/training (as the PLA simulator is used). JH also noted that simulation was a strong means of engaging with the practitioner stakeholders to understand and interrogate the issues of concern is a structured and qualitative (and quantitative) manner to inform the project (additionally noting subsequent red line boundary revision) and the risk assessment.

102 JH noted that metocean conditions simulated did not explore the boundaries of threshold metocean conditions and emphasised the focused objective was instead on exploring the feasible sea room required for pilot transfers. However it is to be noted that wind conditions throughout the proposed array are shown in Figure 2.6 of Chapter 2 of Volume 2 (Marine Physical Processes PINS Ref APP-043 /Application Ref 6.2.2) which illustrates a wind rose based on hindcast wind data from NCEP for the period 1979 to 2016. The wind rose presented indicates a proportion of the wind speeds in the range 10-15 m/s which translates to 19.4 – 29 knots and corresponds with the wind speed applied during the simulation. As noted within the same chapter (APP-043), during the period 1979 to 2016 wind speeds of between 5 - 10 m/s account for around half of the record (9.7 – 19.4 knots). The 25 knot wind speed is therefore clearly and demonstrably representative of prevailing metocean conditions within the region as recorded during the period 1979 to 2016.

103 ***The ExA sought clarification of how experience and ability of masters was explored through use of actors and participants.*** JH explained that four PLA Pilots (nominated by the PLA for the assessment) participated and rotated variously between roles as Pilots, Ships Master and operating other vessels (from the control room). Additionally, a Dover Class 1 Pilot participated as a facilitator and Ships Master. ***The ExA asked if less than optimal communications and experience were explored in the simulations.*** JH noted that common delay scenarios (e.g. delay in rigging pilot boarding ladders) was incorporated into a number of runs. JH commented on familiarity, specifically noting that whilst most participants were broadly familiar with the area it should be recognised that Pilots and the Coxswains are inherent in contributing to the pilotage operations in NE Spit (and this was afforded by the simulations) and whilst many mariners may not have this local area knowledge they remain professionally qualified, under the ships flag state, to navigate in the area.

104 ***The ExA asked if performance improvement was a factor in the 2 days of simulation and whether this was controlled out.*** JH noted that role rotation was undertaken and this was recognised and managed as much as was possible given the nature of the participants familiarity with the simulator (and performance improvement is also a factor in the real world scenario). Furthermore the simulation, being limited to 2 days and over a range of runs which varied significantly, by its nature reduced the likelihood of familiarity from task repetition.

105 ***The ExA observed that if they are being asked to rely upon the outcomes of the simulation, then it should be noted that pilotage transfers will be being undertaken in less than optimal conditions, that whether sufficient number of runs (at 14) is sufficient for meaningful conclusion. ExA also noted the failure of 1/14 runs*** *to which* ScL clarified that this was a marginal (rather than fail) and was not attributable to the Extension. ScL also noted *(Section 5 of Pilot Transfer Bridge Simulation Ref 6.4.10.2)* showing varied metocean conditions that were considered (e.g. restricted visibility), in a context whereby the study was being presented as a qualitative tool to support the wider assessment undertaken in the overall NRA, following a methodology which had been accepted and supported by stakeholders during consultation.

106 Roger Barker and Richard Jackson provided commentary on their concerns and the ***ExA asked these to be submitted in writing*** for a response by the Applicant. London Gateway and Port of London Authority also provided comments on simulation to be submitted in writing.

107 ScL noted that whilst more commentary would be made on this in written submissions, the fundamental conclusion of the study, conducted under an agreed methodology, was that there would be sufficient sea room for pilot transfer operations.

108 JH also clarified, with reference to *Section 5 of Pilot Transfer Bridge Simulation Ref 6.4.10.2)* that in order to provide a fair spread of credible operational scenarios, 6 of the 14 runs were undertaken in poor visibility and 1 in night time conditions. A range of wind directions were tested and wind conditions of 25kts adopted to provide sufficient magnitude to influence handling albeit not be at the operating limits when NE Spit comes off station (as clearly the simulation need to consider scenarios when the NE Spit is available). Common issues were incorporated that might serve to hamper operations such as incorrectly rigged pilot ladders, communication issues/delays and traffic avoidance. It is also noted, with regards to the tug model being used to represent the pilot launch, that it was agreed, during setup *(Ref: Section 3.3.2 of Pilot Transfer Bridge Simulation Ref 6.4.10.2*) that the 'tug provided a close enough facsimile simulation' and that its usage in lieu of a cutter was observed as being precautionary in approach.

109 ***The ExA asked for clarity on what wind strength conditions would cause NE Spit to come off station.*** Richard Jackson noted the interaction between direction and strength of wind and resultant waves. Tidal state is also relevant. Examples by wind direction (stated as from) as below:

- E-NE-N creates largest swell: Up to 25 kts workable. Restrictions in place at 30kts but a durable wind of >24 would create a swell. Tidal state and strength will affect (ebb tide will create a wind over tide scenario with worsened sea state).
- NW wind: Up to 30/35kts prior to restrictions
- S-SW: has worked 50kts routinely and occasionally up to 70kts

110 ***The ExA concluded discussion on the basis that further issues would be dealt with through written submissions with a possible further oral session.***

111 In response to points raised during this section of the hearing, the Applicant understands the following actions to have been identified.

112 **Action:** Applicant to create a plot at suitable scale to demonstrate sea-room in the area and produce evidence based determination of sea-room. To include analysis by draught of vessels.

113 **Action: The** ExA requested the Applicant to develop Figure 52 to demonstrate the understood sea room at this point (and variance due to various tidal levels and vessels) with a conservative 1.5m Under Keel Clearance.

8 Issue Specific Hearing 2. – Agenda Item 6. Maritime Safety: Working with the Environmental Statement (ES) and the Navigation Risk Assessment (NRA)

114 ***The ExA asked the Applicant to explain the approach to risk assessment in relation to marine safety as documented in the ES and the NRA, in relation to methodological basis for findings that marine risks have been reduced as low as reasonably possible (ALARP***).

115 ER explained by way of introduction that the NRA followed an internationally adopted process – the International Maritime Organisation Formal Safety Assessment methodology which is defined as the appropriate methodology by Maritime and Coastguard Agency.

116 The Formal Safety Assessment (FSA) steps are contained within Chapter 8 of the Navigation Risk Assessment report as follows:

Step 1: Identification of Hazards (NRA 8.2)

- Total of 38 TEOW construction/decommissioning hazards and 29 TEOW operational hazards (67 hazards)

Step 2: Hazard Scoring (NRA 8.3)

- Each hazard scored based on likelihood and consequence to generate a risk score 0-10.

Step 3: Risk Controls (NRA 8.5)

- Risk controls identified as “embedded” are included to generate “Inherent Risk Scores”

Step 4: Cost Benefit (NRA 8.5.3 Table 22) – *Optional Stage*

- Risk controls identified as “additional” are included to generate “Residual Risk Scores”

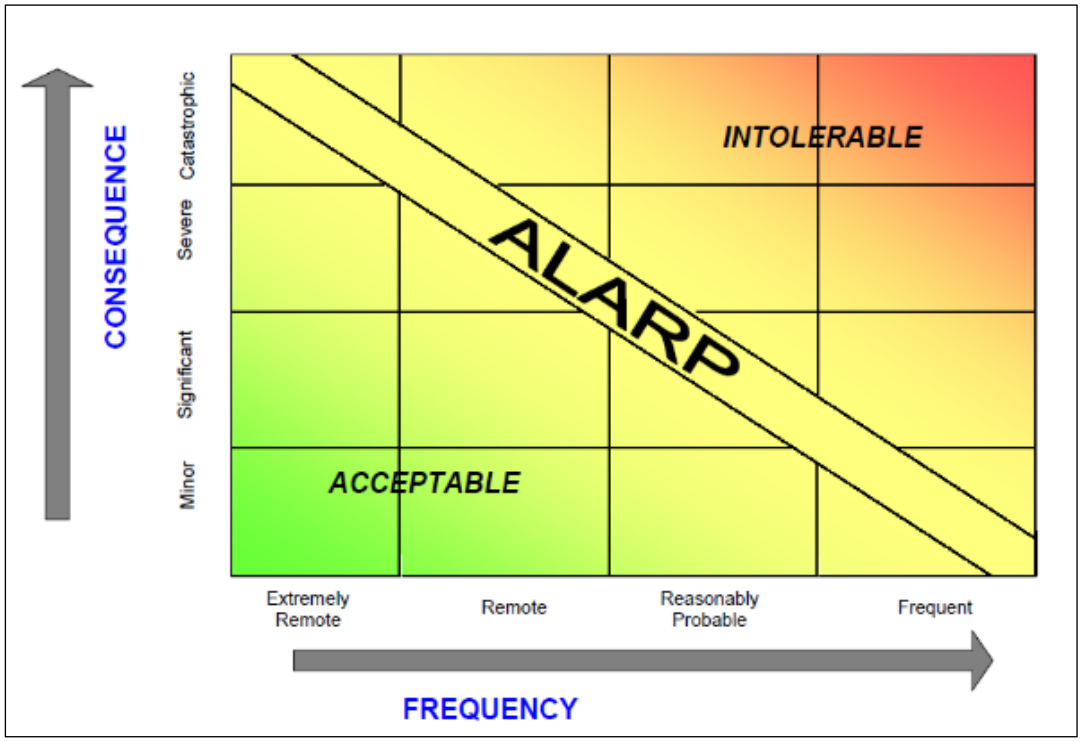
Step 5: Recommendations (NRA 8.6)

117 The FSA risk assessment is supported by various analysis, studies and consultation feedback to help identify hazard risk and control measures.

118 The process is distilled into the ES which also assesses non-safety impacts – such as impacts vessels needed to transit further distances to avoid the Thanet Extension Offshore Wind Farm.

119 ***The ExA asked whether the mechanism for scoring of hazards are a standard risk type assessment approach.***

120 ER explained that it is standard but there is more complexity to it than a single assessment. The risk assessment process is what is as recommended by the Internaional Maritime Organisation (IMO) and what the MCA utilise. It is based on a risk matrix where likelihood and consequence is combined together to give a resultant risk score (see General risk matrix - NRA Annex B Page B-3 – below)



121 ***The ExA asked if the consequence band equated to the consequence band used for the schematic.***

122 ER confirmed that is the case and referenced the likelihood table (Table 18 from the NRA) and the consequence table (Table 19 from the NRA).

123 Continuing with his description of the methodology, ER explained how, using the NRA Table 18 at page 112 of the NRA each hazard is assessed for the likelihood of occurrence.

Table 1: Frequency criteria.

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

124 Consequence categories and criteria.

Cat.	People	Property	Environment	Business
C1	**Negligible** Possible very minor injury (e.g. bruising)	**Negligible** Costs <£10k	**Negligible** No effect of note. Tier1 may be declared but criteria not necessarily met. Costs <£10k	**Negligible** Costs <£10k
C2	**Minor** (single minor injury)	**Minor** Minor damage Costs £10k –£100k	**Minor** Tier 1 – Tier 2 criteria reached. Small operational (oil) spill with little effect on environmental amenity Costs £10K–£100k	**Minor** Bad local publicity and/or short-term loss of revenue Costs £10k – £100k
C3	**Moderate** Multiple minor or single major injury	**Moderate** Moderate damage Costs £100k - £1M	**Moderate** Tier 2 spill criteria reached but capable of being limited to immediate area within site Costs £100k -£1M	**Moderate** Bad widespread publicity Temporary suspension of operations or prolonged restrictions at wind farm Costs £100k - £1M

C4	**Major** Multiple major injuries or single fatality	**Major** Major damage Costs £1M -£10M	**Major** Tier 3 criteria reached with pollution requiring national support. Chemical spillage or small gas release Costs £1M - £10M	**Major** National publicity, Temporary closure or prolonged restrictions on wind farm operations Costs £1M -£10M
C5	**Catastrophic** Multiple fatalities	**Catastrophic** Catastrophic damage Costs >£10M	**Catastrophic** Tier 3 oil spill criteria reached. International support required. Widespread shoreline contamination. Serious chemical or gas release. Significant threat to environmental amenity. Costs >£10M	**Catastrophic** International media publicity. wind farm site closes. Operations and revenue seriously disrupted for more than two days. Ensuing loss of revenue. Costs >£10M

125 ER noted that risk is assessed against three profiles - Baseline risk, Inherent risk and Residual Risk, with:

126 The Baseline Risk profile relates to the navigation risk in the study area with no windfarm extension in place and is undertaken against the FSA Step 1 & 2. This provides a baseline assessment of navigation risk which includes the existing wind farm and any mitigation or controls measures that are in place at the moment.

127 In order to determine the increase in navigation risk brought about by the Thanet Offshore Wind Farm Extension an Inherent Risk profile was assessed, this assumes that the extension is in place and that "embedded" risk control measures are applied – this effectively follows Steps 1,2 &3 of the FSA – which has a feedback loop designed for this process. The risk profile for the inherent assessment applies for all construction/decommissioning and operation hazards of the Thanet Offshore Wind Farm Extension.

128 A final assessment of risk is undertaken to generate the Residual Risk profile – this includes the extension, embedded risk controls and additional risk controls – this effectively follows FSA Steps 1, 2, 3 & 4. This allows for an assessment of risk that shows the final risk scores if recommended risk controls are applied to the project.

129 Each hazard is assessed against likelihood and consequence and a risk score determined from a scale of 0-10. Assessment of risk is referenced to a classification level. The classification levels (Negligible, Low Risk, ALARP, Significant Risk and High Risk – shown in a table at Annex B page 7) are benchmarked to risk matrices referenced in MCA guidance and have been used on a variety of Navigation Risk Assessments over the last 20 years including for Offshore Windfarms and Port Risk Assessments (e.g. Blyth Offshore Windfarm and PLA port wide risk assessment uses a similar approach). The risk score classification table shows ALARP level hazards at 4 to 6.9.

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

130 ***The ExA asked for further explanation of the relationship between risks controlled to ALARP, and that which is deemed tolerable risks and the consistency of approaches taken in relation to navigation risk and marine safety and the assessment of risk significance in the ES more broadly.***

131 The acceptability or tolerability of hazards is derived from the navigation risk assessment process which enables both qualitative/subjective (e.g. local knowledge and expert judgement) and quantitative data (e.g. vessel track analysis, incident analysis, collision and contact risk modelling), to be fed into the assessment of risk for all hazards.

132 The risk score classifications (see lower table at NRA Annex B Page B-7) within the NRA have regard to available guidance (DTI Guidance on the Assessment of the Impact of Offshore Wind Farms – Methodology for Assessing the Marine Navigational Risks of Offshore Wind Farms – in association with MCA & DfT.

133 Where hazards are scored at ALARP, and risk controls have been applied, (whether embedded or additional), and the benefit of additional risk controls is outweighed by the cost or sacrifice (if none cost aspects are evident – e.g. utility / environment / societal), then additional controls are not mandated, the hazard assessed to be ALARP / Tolerable.

134 The NRA by necessity focuses on navigational safety, the ES assessment criteria focuses on all impacts to Shipping and Navigation, whether safety related or not. The ES assessment is therefore different to the IMO FSA NRA as impacts (some safety some economical) are assessed against a significance of potential effects matrix (ES Table 10.5) not a NRA risk matrix (See NRA Annex B-7). However, the ES Significance table was primarily benchmarked against navigation risk as stakeholder concerns revolved around navigation safety.

135 ***The ExA asked whether existing maritime conditions, having regard to available sea room, vessel traffic and the existing wind farm, may already take the assessment of risk at a level which is beyond the threshold of tolerable, such that an incremental increase in risk would not allow a conclusion of tolerable risk.***

136 ER answered the baseline assessment of risk, without the extension in place, does not show the risk in the area to be beyond a threshold of tolerable. This is evidenced by the conclusion reached in the report and the absence of any concerns being raised by stakeholders over the last 8 years of Thanet windfarm operation. ER stated that there is no record of serious incidents associated with the Thanet Windfarm so there is no evidential basis for any conclusion that the baseline risk is not tolerable.

137 In terms of collision risk at Figure 39 on page 60 of the NRA, there were only 3 collisions identified within 5 nm of the windfarm between 1997-2015, all of which occurred prior to the Thanet windfarm being in operation. Two of which were associated with recreational and fishing vessels close to the coast. The third collision was between two tankers and occurred within the Margret Roads anchorage well away from the wind farm extension. There is no evidence that the existing wind farm has caused any increase in actual collisions.

138 If there was such a high risk in this area we would expect to see either a hot spot of incidents over the last 8 years of windfarm operation, or some additional risk controls applied in the area or a documented risk assessment demonstrating navigation safety is being managed. There is no evidence of stakeholders regarding current maritime conditions as needing any specific measures to deal with any particular risk.

139 ***The ExA noted the need to address the divergence between the conclusions of the NRA, in particular that there was not a scenario where an intolerable risk would arise, and the qualitative assessment advanced by IPs.***

140 ER noted that theoretically there may be hazards which without embedded risk controls, could be regarded as intolerable, but in practice this simply would not be the case and the assessment focussed on risk with embedded controls in place. It was important to appreciate that the inherent risk profile involved the adoption of those controls which, following through the methodology, did not involve a movement into areas of "intolerable' risk beyond ALARP. The conclusions of the assessment were reached based on a detailed application of a methodology which had been agreed with consultees and there had been no detailed dispute with the assessment which led to the assessment of not only baseline risk but the inherent and residual risks with the scheme in place. That assessment showed that under the various categories of risk an "intolerable" risk would not arise, having regard to the baseline evidence (which again had not been disputed).

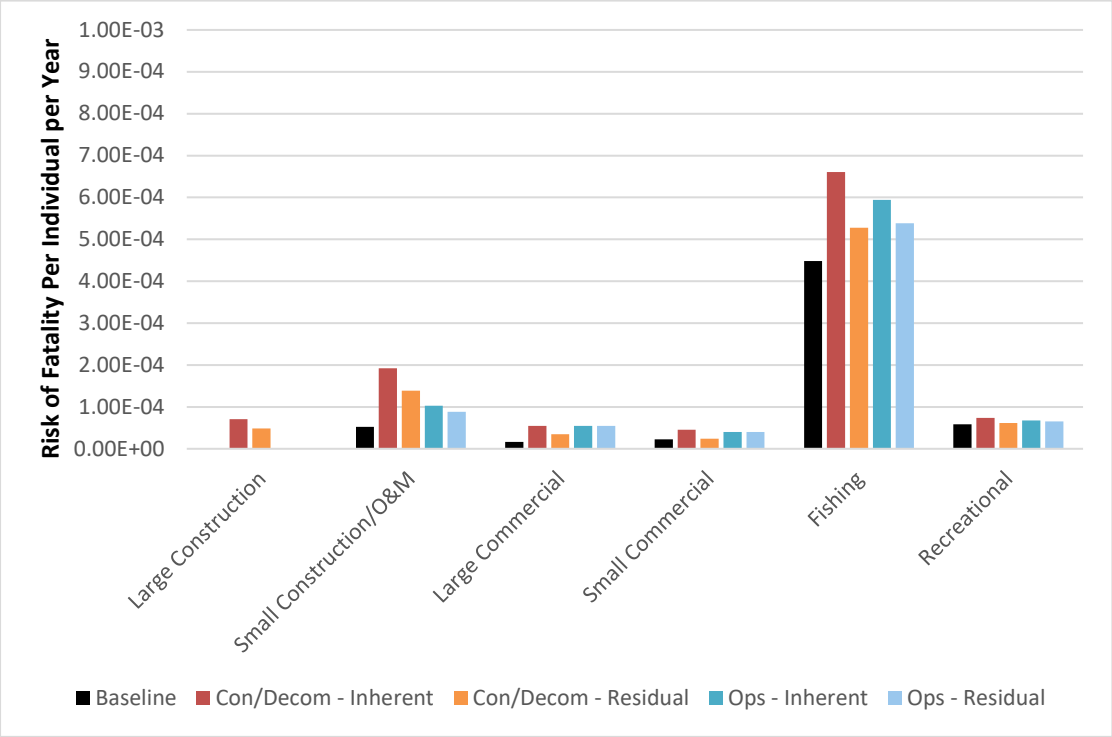
141 ***The ExA then referred to MCA 2013 methodology where the phrasing regarding tolerability is as a minimum aggregate of all, looking at the overall picture of hazards and not a single individual hazards how the NRA have looked at.***

142 ER explained that the aggregate position was considered on the understanding that it is identified in the "2013 DTI Guidance on the Assessment of the Impact of Offshore Wind Farms: Methodology for Assessing the Marine Navigational Safety Risks of Offshore Windfarms". There is no specific guidance on this issue but reference is made to HSE guidance which was addressed in the NRA (and is the generally accepted approach of the HSE_. Further to the FSA risk assessment section 8.6.3 "Acceptability of Risk" sought to further demonstrate the navigation hazards were tolerable when referenced to HSE guidance (HSE 1999 – Reducing Risks, Protecting People) which defined thresholds of acceptability/tolerability of:

- 1 x 10–3 fatalities per year for a crew person
- 1 x 10–4 fatalities per year for a member of public

143 This scale has been used in other OREI NRAs see for example Kincardine Offshore Wind Farm NRA, Rampion Offshore Wind Farm NRA and Hornsea 3 Offshore Wind Farm as selected recent examples. A conservative estimate of individuals exposed was made based on each ship type taking into account all of the individual hazard likelihood and consequence scores to give an aggregate result (Baseline, Inherent and Residual). This produced NRA Figure 66, showing that all hazards by ship type fall into HSE Acceptability levels.

Figure 66: Risk of a fatality per individual per year.



144 Further to this the ES effectively considers the wider impact of the extension in a societal context, with Shipping and Navigation specifically covered in Chapter 10.

145 The ExA confirmed that further specific issues would be raised through written questions.

146 ScL and ER responded to concerns raised by IPs regarding the conclusions of the NRA, including alleged limitations in the pilot study (PLA and ESL).

147 It was noted that the Port of Tilbury and London Gateway would provide comments specifically on the NRA at Deadline 1, but had not advanced any detailed criticisms to date (and are not within statutory harbour authority areas in close proximity to the TEOW so would not normally be consulted on navigational safety aspects of the proposed extension).

148 PLA and ESL were both were consulted extensively on the NRA, and supporting studies, and their comments were taken into account in detail: see NRA Table 8: Consultation Table page. Criticism of the Pilot Bridge Simulation Study were only raised orally at the hearing, despite the PLA being given the opportunity to review the simulation plan, the draft simulation findings report, and having attended (and participated) all of the simulations.

149 Other concerns had been expressed without any detailed evidential basis to counter the assessment carried out in the NRA, or justify any alteration to the western extent of the red line boundary as had been suggested at the hearing.