From:	Dominika Phillips
To:	Kay Sully; KJ Johansson; Hornsea Project Three
Cc:	Andrew Guyton; Stuart Livesey
Subject:	Hornsea Project Three (UK) Ltd response to Deadline 5 (Part 3)
Date:	23 January 2019 21:05:08
Attachments:	image001.png D5_HOW03_Appendix 6_Immature apportioning.pdf D5_HOW03_Appendix 7_IOGP AMG.PDF D5_HOW03_Appendix 9.pdf D5_HOW03_Appendix 10_Article 6(4) Guidance.pdf D5_HOW03_Appendix 11_MarLIN.pdf D5_HOW03_Appendix 12_Ornithology Roadman_vB.pdf D5_HOW03_Appendix 13__Anatec.pdf D5_HOW03_Appendix 14_HCA_BeatriceA.pdf

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Dear Kay, K-J

Please find attached the 3rd instalment of documents.

Best regards,
Dr Dominika Chalder PIEMA
Environment and Consent Manager

[redacted]

Environmental Management UK | Wind Power
5 Howick Place | London | SW1P 1WG

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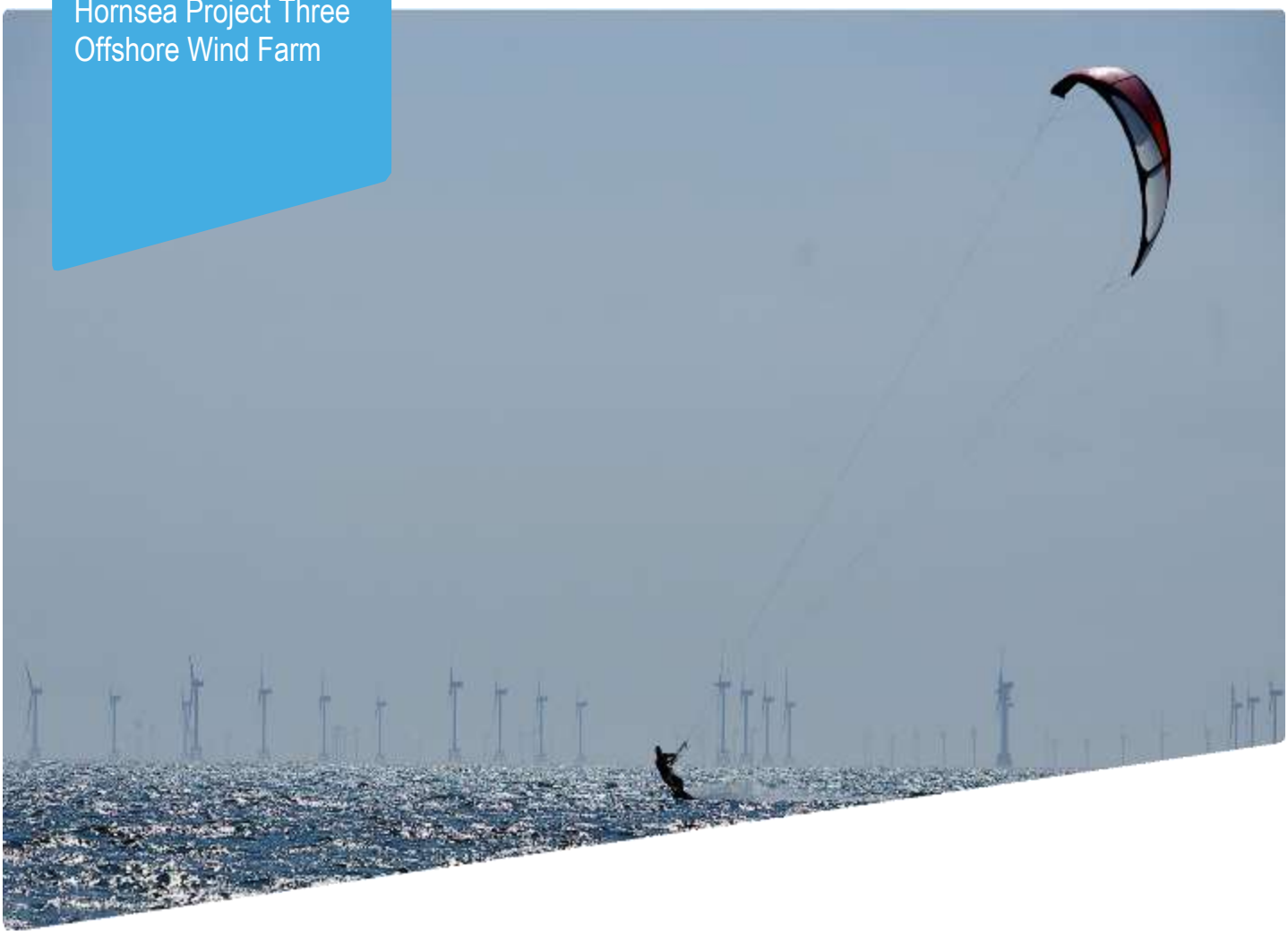
Hornsea Project Three
Offshore Wind Farm



Hornsea Project Three

Offshore Wind Farm

Appendix 9 to Deadline 5 submission - Summary of Array Layout Position and Applicants response to Interested Parties answers to ExA Q2.5.1, Q2.5.6 and Q2.5.7

Date: 23rd January 2019

Hornsea 3
Offshore Wind Farm

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Front cover picture: Kite surfer near a UK offshore wind farm © Ørsted Hornsea Project Three (UK) Ltd., 2019.

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1. Summary Array Layout Summary (including Applicant's responses to IPs answers to ExA Q2.5.1, Q2.5.6 and Q2.5.7 at DL5)

Development Principles

1.1 Since 2016 the Applicant has been working closely with the Maritime and Coastguard Agency (MCA) and Trinity House to ensure that Hornsea Three is designed with safety for third party users as a priority constraint. The need for design flexibility at the consent stage is well understood and this is managed through the consent envelope. This means that it is standard practice for the final layout of array structures within a Project to be determined after the consent has been awarded given the potential variations in the design parameters that are available.

1.2 As has been made clear by the Applicant in order to avoid potential delay in the approval process for the final array layout Hornsea Three has sought to promote the "Layout Development Principles" to serve as a framework around which the final layout plan will be developed, thereby facilitating the approval process post consent (much in the same way that the In-Principle Monitoring Plan is proposed to facilitate the development of the Projects monitoring plans).

1.3 The Layout Development Principles should be seen as advantageous to all parties because not only do they provide confidence at this early stage that the detailed design proposed by the Applicant will accord with the expectations of the MMO and MCA, but also it will ensure less resource (from the MCA and MMO) is required at the approval stage.

1.4 The Applicant and MCA and TH continue to engage to resolve, where possible, outstanding issues in the SOCG. Matters of disagreement with regards to Principle 11 have been resolved by new wording within the Layout Development Principles and the SOCG has been updated to reflect all parties' agreement of this.

Hornsea Project Three

1.5 Following identification of issues within early layout discussions (with the MCA) regarding Search and Rescue (SAR) helicopter access the Applicant took the step to engage a specialist, Mark Prior, in SAR helicopter operations in 2018. Mr Prior's CV is attached as annex 1 to this response.

At this point in the examination process the Applicant believes three main issues remain not agreed:

1.5.1 That provision of a 1 kilometre (km) Helicopter Refuge Area (HRA) (with Automatic Identification System (AIS) transmitters on key structures) is sufficient to provide safe access/egress and locational reference to SAR Helicopters.[i]

1.5.2 That the equipment (based on published specifications) on board the SAR helicopter does allow for a 300 metre (m) development to be effectively searched.

1.5.3 That a single line of orientation does allow safe access into the array for surface and air navigation, and that two lines of orientation remain a preference but not prerequisite to the MCA.

Helicopter Specialist and Consultation with the MCA

1.6 The Applicant's helicopter specialist, Mark Prior, was engaged by Hornsea Three to assist with the Layout Development Principles to ensure that any principle put forward did not impact on SAR helicopter safety and that the principles are based on technical information and expert experience in accordance with MCA guidance contained within MGN 543.

1.7 The Applicant has provided this technical information and knowledge to the Examination to support its justification of the Development Principles and that SAR operations will not be adversely affected by any layout that is developed under them. The Applicant notes that the MCA has not provided a direct response which includes evidence to counteract the Applicant's points 1 to 3 noted above. It is also noted that the MCA has not provided its own technical evidence to the Applicant to support the MCA's position including outputs of trials that have been undertaken. Consequently, the Applicant has not been able to respond.

1.8 Furthermore, the Applicant has requested to meet (in an official capacity as part of the Examination process) with the MCA's helicopter service provider; however, MCA states this has not been possible because the helicopter operator of the MCA's SAR contract may change sometime in the future.

1.9 In the absence of an evidenced position from the MCA the Applicant has been constrained in how much progress it has been able to make on this matter.

Single Line of Orientation (and reply to MCA response to Q2.5.1)

1.10 Prior to Deadline 4 the Applicant met with the MCA to discuss the Layout Development Principles. The guidance provided in MGN 543 was discussed in relation to the inclusion of a single line of orientation. As reflected in the MCA's response a single line of orientation will be acceptable if a suitable safety case is presented but the MCA has a preference for two. The Applicant clarified that the safety case would be based around the evidence provided in the Navigational Risk Assessment (NRA) [APP-112] as follows:

- Evidence demonstrates that commercial vessels are unlikely to transit through the array given there are no distance/time benefits to doing so.
- Predicted levels of transiting vessels through the array (recreational and commercial fishing) will be low compared to other constructed and/or consented wind farms due to the distance offshore.
- Historical data indicate vessels that do choose to navigate through arrays do not typically do so in straight lines (see section 23.13.3.8 of the NRA [APP-112]).
- Consultation feedback from commercial, recreational and fishing operators demonstrated no significant safety concerns about the indicative layouts that had a single line of orientation and that orientation was often associated with ease of navigation rather than a vessel being at increased risk of allision.

- Minimum internal spacing committed to by the Applicant is larger than other existing constructed, consented or Round Three developments giving vessels more sea room to navigate and manoeuvre within the Hornsea Three array area (when considering turning circles and rates of turn). When responding to the question on other projects with a single line of orientation agreed, the MCA note in their Deadline 4 response (REP4-129) that there is a clear need to adapt, and although one line orientation may previously have been acceptable it may now not be; however, in response to that the Applicant has demonstrated that wind farm development has also adapted and minimum spacing at Hornsea Three combined with the distance that turbines are being developed offshore has meant that wind farms are now more accessible but less likely to be transited by passing commercial or recreational vessels.
- **SAR helicopter specialist considers there not to be a risk to SAR operations associated with one line of orientation when considering the 1,000m / 1 kilometre (km) minimum spacing.**

1.11 Single line of orientation layouts were discussed at a consultation meeting in December 2017 including the proposed safety case for them. It was noted that the NRA and Environmental Statement (ES) included layouts that committed Hornsea Three to a single line of orientation (as its worst case) and at the time the MCA noted the new layouts (from those shown in the Preliminary Environmental Information Report (PEIR)) were a positive step forward and the Layout Development Principles would work well as part of the Development Consent Order (DCO) process.

1.12 Following discussions on the consultation undertaken pre-submission and during the consultation meeting held in January 2019 an amendment was made to Principle 3 of the Development Principles which is reflected in the Statement of Common Ground (SoCG) (REP1-221) between the Applicant and the MCA. The full Principle 3 now reads as follows:

> *"The layout shall include SAR Access Lanes parallel to turbine development corridors (on a minimum of one line of orientation) within the Hornsea Three Array Area and any Phase subject to a demonstrated safety case. The SAR Access Lanes shall satisfy the minimum width of 500m required by MGN 543 to facilitate SAR Asset access.".*

1.13 It was noted in the MCA's response to Deadline 4 (REP4-129) that the NRA had considered one line of orientation as its worst case. All impacts assessed within the NRA were within As Low As Reasonably Practicable (ALARP) parameters as agreed with the MCA in their SoCG.

HRA (and reply to MCA response to Q2.5.7)

1.14 Consultation regarding the HRA has been on-going for over a year; however the Applicant notes that the MCA's position has shifted to the extent the technical requirements have become confused. Initially the HRA was proposed by the MCA to allow access during low cloud or emergency egress from an array in the event of the SAR helicopter malfunctioning, and would be required regardless of the number of lines of orientation present within the array (for any wind farm). The distance was also calculated on SAR helicopters' radius of turn, MGN 543 notes 'the required distance for the helicopter refuge area has been calculated by trials[1] conducted by SAR helicopters based on their turning radius at set speeds, exercises within windfarms and training in simulators'. Recent submissions from the MCA now state the need for an HRA has moved away from being egress to one of enabling a SAR helicopter to orientate itself within the array during adverse conditions.

1.15 Following consideration of these points the Applicant notes that their technical evidence still demonstrates that an HRA is not required; despite this, prior to Deadline 4 the Applicant met with the MCA to discuss the Layout Development Principles. Following discussions, the Applicant has updated Principle 5 of the Layout Development Principles to include a minimum width of 1km for the required HRA (REP4-075).

1.16 The Applicant has agreed the inclusion of an HRA as the technical evidence demonstrates that 1km is a sufficient width for an HRA for the purposes of SAR access, as outlined by the MCA in Annex 5 of MGN 543, and to date this evidence has not been countered by the MCA.

1.17 Taking into account the second point raised in regard to the ability for the SAR helicopter to orientate itself, the Applicant has proposed that AIS transponders linked to SAR lighting would provide an equal, if not greater safety tool to pilots during operations within the array. Trinity House has agreed this would be possible and would be acceptable when considering potential impacts to shipping and navigation.

[1] MGN 543 notes *'Live trial undertaken by the Inverness based S92 SAR helicopter over Loch Ness in January 2018. Simulator trials undertaken over a period of months and concluded in April 2018. Exercises conducted in 2016, 2017 & 2018'.* The Applicant notes that the full technical report for these trials has not been provided.

Development Lanes (and reply to MCA response to Q2.5.6)

1.18 In relation to the MCA's first concern (in their response to Q2.5.6), the Applicant notes that the SAR lanes have been designed in line with the requirements set out by the MCA in MGN 543 and would allow SAR helicopter access in all weather conditions. In relation to the second element of the MCA's response, the Applicant refers to its response at Deadline 4 (REP4-012)– technical evidence gathered demonstrates that the development lanes are searchable given the high level of equipment fitted to SAR helicopters. In particular, the MCA's response implies that the only effective search is a visual search and does not take account of the actual capability of the suite of sensors fitted to their SAR contractor's helicopters.

1.19 Additionally, the Applicant also notes that the tender for the SAR helicopter provision (released in 2012[2]) states that the contractor was required to provide the following ability in its provision of UK SAR helicopter services to the MCA:

Section 4.1.2.3 - Spatial awareness - The Avionics Suite must, throughout Aircraft Operation, be able to:

- *detect and display to the Aircrew the relative position of surface contacts in the maritime environment down to a range of 150m with sufficient resolution to detect Vessels and assist in collision avoidance against all surface contacts; and*
- *determine and display to the Aircrew the track to within +/- 5 degrees of actual track and speed to within +/- 2 knots of actual speed of such detected surface contacts in the maritime environment.*

Section 4.1.11.7 - The Aircraft and Avionics Suite must, throughout Aircraft Operation, be able to:

- *approach Offshore Installations in a lateral visibility of 150m or greater;*

Sections 4.1.2.3.4 - The Avionics Suite must, throughout Aircraft Operation, enable Operations over water, in the vicinity of coastlines and in a Reduced Cue Environment down to 150m lateral visibility.

1.19.1 *Section 4.2.2.2.3.2 - The Avionics Suite must be able to distinguish persons against their immediate environment (with reference to difference in emissivity) with sufficient accuracy and resolution to permit detection of a person or persons in the water at a slant range of at least 750 metres from the Aircraft and display this to the Rear Cabin*.

1.20 The surface contact referred to in Section 4.1.2.3 could be any structure within a wind farm array. It is noted that section stated all of the above requirements were deemed mandatory.

1.21 As with the HRA the Applicant believes its technical evidence demonstrates that the +/- 150m tolerance does not prevent SAR being effectively undertaken within the array.

[2] https://data.gov.uk/data/contracts-finder-archive/contract/752957/

DCO

1.22 It is noted that in the MCA's response to Deadline 4 they express an interest in commenting on the draft DCO in a separate submission. The Applicant notes that a submission has not yet been made and would ask that this is made as soon as possible so that the MCA's views may be reviewed and responded to.

2. Summary of Current Position

2.1 In summary the following position is noted.

- Technical evidence provided by the Applicant's SAR helicopter specialist demonstrates that an HRA of 1km is safe and sufficient to meet the purpose noted by the MCA. This includes the additional inclusion of AIS transmitters on key structures which the Applicant is content to provide to aid pilot (or mariner) orientation in the event of a SAR incident.
- The Applicant's technical evidence also demonstrates that the 300m development lanes can be searched effectively using the contracted equipment carried on board the SAR helicopters. The Applicant believes that an unrealistic position is being taken by the MCA and is not in line with the contract that SAR providers are required to deliver to the MCA.
- The Applicant's evidence demonstrates that a single line of orientation would not increase risk to vessels within the array nor would it hinder SAR operations, noting that the frequency of occurrence (of an incident requiring a helicopter to perform a SAR operation) is expected to be very low.

Request for ISH on aviation matters in w/c 4 March 2019

2.2 Finally as the MCA did not attend the first Issue Specific Hearing (ISH) and consequently the Applicant is concerned that the ExA has not had the opportunity to test the evidence before it by putting oral questions to the technical experts retain by the parties.

2.3 Therefore, the Applicant requests that another ISH dedicated to aviation matters is scheduled in the week commencing 4th March 2019. For that to be effective, the MCA and its SAR provider/expert should be asked to attend the ISH. The Applicant is confident that if the ExA has the opportunity to put questions to, and discuss issues with, the Applicant's technical experts, in a hearing, it will have confidence in placing significant weight on the Applicant's evidence in this regard.

Annex 1 The Applicant's Helicopter Specialist – Mark Prior

PERSONAL SUMMARY

A highly experienced aviation professional with a wide range of expertise in certification, safety analysis, investigation, operations, technical issues and regulations. Over 38 years' experience as a pilot, initially in the Royal Air Force, then as a licensed civil pilot with concurrently 25 years of experience as an Experimental Test Pilot. Since 2003 an industry representative on a number of rule-making, operational and research groups.

CONSULTANCY, SAR AND SAFETY EXPERIENCE

Technical Director M Prior Consulting Ltd., Nov 2016 – present

Providing clients with technical, regulatory and safety expertise to enhance their operational efficiency, effectiveness and risk management.

Current projects include:

- Helicopter Terrain Awareness Warning System (H-TAWS) research for the UK Civil Aviation Authority (CAA) to refine offshore Mode 1-7 thresholds using Flight Data Monitoring data.
- Safety study, in conjunction with Helios Technology, for the UK CAA on the safety of automated offshore approaches.
- Involvement in rewriting Def Stan 00-970 – certification requirements for military helicopters - for the UK MOD
- ***Providing Search and Rescue (SAR) advice to the Irish Coastguard***
- Compliance Verification Engineer (CVE) for a Part 21J Design Office. Areas of expertise include aircraft performance and handling, cockpit ergonomics, safety systems and Operational Suitability Data (OSD)
- Safety audits for oil and gas clients
- Co-lead for a HeliOffshore work-stream on Approach Path Management

Aircraft Commander – Bristow Group – concurrent with other roles - 1998-2016

Operating in the all-weather Instrument Flight Rules offshore commercial air transport and offshore SAR roles. Offshore SAR included being the project manager for the BP Jigsaw Trial, flying as a SAR Commander on the trial as well as SAR experience operating out of Den Helder. Types flown offshore include the Super Puma Mk1, Super Puma Mk2 and EC225.

Senior Manager Safety Analysis – Bristow Group - April 2014 – October 2016
Responsible for the management of the Global Aviation Safety Office which processes, analyses and investigates accidents and incidents affecting the Bristow Group worldwide; this includes both rotary and fixed wing operations with Eastern Airways and AirNorth being integrated into the system.

Manager Global Operational and SAR Standards –Bristow Group: July 2010 –April 2014

Responsible for the design, implementation and auditing of Group standards across the Group, and subcontractors, suppliers and affiliates. Lead auditor for audits into the design, certification and production of aircraft for 3 major helicopter manufacturers.

PREVIOUS FLIGHT EXPERIENCE

Aircraft Commander – Bristow Group – concurrent with other roles - 1998-2016

Operating in the all-weather Instrument Flight Rules offshore commercial air transport role. Types flown offshore include the Super Puma Mk1, Super Puma Mk2 and EC225.

Experimental Test Pilot – Royal Air Force – 1992 - 1998

Trained at the French Test Pilot School – école du personnel navigant d'essais et de reception (EPNER), 1992-93.

Following EPNER, appointed as the Certification Flight Commander on the Rotary Wing Test Squadron, Boscombe Down, 1993-1998. The role included the management and conduct of flight trials on new aircraft, systems and the optimisation of operational techniques.

Operational Royal Air Force Pilot – 1979 -1992

Following training, flew 2 tours on the SA330 Puma and 1 tour on the Lynx Mk1/7, as well as 1 staff tour on the EH101 Project Team MOD London

KEY ROLES AND APPOINTMENTS

- Co-lead for the International Civil Aviation Organisation (ICAO) helicopter all weather operations (AWOPS) workstream and member of the ICAO Helicopter Sub Committee.
- Member of the EASA All-Weather Operations Rule Making Task
- Member of the CAA H-TAWS Research Group
- Member of the Royal Aeronautical Society Rotorcraft Committee
- Member of the Radio Technical Commission for Aeronautics (RTCA) Special Committee 212 H-TAWS committee.
- Member of EASA Ops 001 Group – transposing JAR OPS 1 and 3 into EASA Part Ops
- Member of the EASA Safety Standards Consultative Committee
- Member of the Joint Aviation Authority (JAA) Helicopter Sub-Sectorial Team which developed JAR OPS 3.

KEY SKILLS AND COMPETENCIES

- Comprehensive knowledge of EASA Regulations; being part of the ICAO and EASA rule making process.
- Trained incident investigator and auditor.
- Developer and adapter of safety procedures. Examples: development of the Bristow Safety Incident Investigation process; development of the Company Just Culture policy.
- Testing and introduction of new aircraft, systems and procedures. Example, the world-first introduction of Traffic Collision Avoidance System (TCAS) II to helicopters, modification designed by the Bristow Design Office.
- Assessment of aircraft and systems. Most recent assessment was the AW609 tiltrotor.
- Involved in the investigation of serious incidents and accidents, including liaison with the AAIB and NTSB.
- Flown over 70 types of aeroplanes, helicopters, airships and tiltrotor.

AWARDS

Royal Aeronautical Society Rotorcraft Group Award and Alan Marsh Medal – 2013:

"These awards are in recognition of the continuous series of contributions that he has made, and the standard that he has been instrumental in setting, in relation to flight safety during a career based around Flight Test and regulatory improvement."

[i] The Applicant acknowledges that the provision of a 1 km HRA was presented to MCA as part of a teleconference on the 10th January. The 1 km HRA was not agreed at the meeting, however MCA may be considering the acceptance of a 1 km HRA.