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[D4\\_HOW03\\_Appendix 49\\_Roulund et al 2019a.pdf](#)  
[D4\\_HOW03\\_Appendix 50\\_Roulund et al 2019b.pdf](#)  
[D4\\_HOW03\\_Appendix 51\\_Defra MC7 Guidance 2010.pdf](#)  
[D4\\_HOW03\\_Appendix 53\\_WQ\\_2.1.3.pdf](#)  
[D4\\_HOW03\\_Appendix 54\\_Aviation Assessments.pdf](#)  
[D4\\_HOW03\\_Appendix 55\\_Development Principles\\_rev2.pdf](#)  
[D4\\_HOW03\\_Appendix 56\\_Manwell et al 2009.pdf](#)  
[D4\\_HOW03\\_Appendix 57\\_Helideck Certificates.pdf](#)  
[D4\\_HOW03\\_Appendix 58\\_Indicative Array Layout.pdf](#)  
[D4\\_HOW03\\_Appendix 59\\_FCLP\\_rev3.pdf](#)  
[D4\\_HOW03\\_Appendix 60\\_Draft CFD Budget Notice.pdf](#)  
[D4\\_HOW03\\_Appendix 62\\_O2.2.34.pdf](#)  
[D4\\_HOW03\\_Appendix 63\\_O2.2.7\\_O2.2.44.pdf](#)  
[D4\\_HOW03\\_Appendix 64\\_Dogger Bank.pdf](#)

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Dear Kay, K-J

Please find attached the 12<sup>th</sup> instalment of documents.

Best regards,  
**Dr Dominika Chalder PIEMA**  
Environment and Consent Manager



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Hornsea Project Three  
Offshore Wind Farm



## Hornsea Project Three Offshore Wind Farm

Appendix 55 to Deadline 4 submission – Updated Layout  
Development Principles

Date: 15<sup>th</sup> January 2019

**Hornsea 3**  
Offshore Wind Farm

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## 1. Glossary of Terms

Table 1.1: Defined terms.

Term	Definition
Hornsea Three Array Area	Consented development area where Surface Infrastructure shall be installed.
Surface Infrastructure	Includes for the purpose of these principles wind turbines, substations, accommodation platforms and Bridge Linked Platforms.
Bridge Linked Platform	Surface Infrastructure connected by a bridge link; are assumed to be a single unit of Surface Infrastructure for the purpose of these principles.
Phase	Refers to a defined portion of developed area within the Hornsea Three Array Area.
Search and Rescue (SAR) Asset	Surface or air based resource tasked to a SAR event.
Helicopter Refuge Area	A 1,000 metre lane that is clear of any Surface Infrastructure (or blade over sail) and at a notably different angle to the direction of the SAR Access Lanes. The Helicopter Refuge Area shall allow entry/exit across the array (or as an alternative provide multiple short lanes to allow access from opposing sides of the array).
Line of Orientation	Consistent transit lines on the same bearing throughout the Hornsea Three Array Area or a Phase. The Lines of Orientation form the centre lines of the SAR Access Lanes.
SAR Access Lane	A defined lane which allows a SAR Asset to transit safely along a Line of Orientation through the Hornsea Three Array Area or a Phase.
Internal Development Lane	A defined straight lane within which Surface Infrastructure shall be constructed.
Close Proximity	For the purpose of these rules close proximity for SAR Assets is defined as no closer than 250m minimum radius around any SAR Asset measured from] the blade tips that are transverse to the SAR Lanes or the external point of any structure.
Perimeter Development Lane	A defined lane around the perimeter of the Hornsea Three Array Area or a Phase in which Infrastructure shall be constructed.
Defined Navigation Corridor	<i>A corridor intended for the purposes of navigation, between Hornsea Project One, Hornsea Project Two and Hornsea Three. A vessel is defined to be within the Defined Navigation Corridor when it has Surface Infrastructure on its beam to both port and starboard, and leaves the Defined Navigation Corridor when it no longer has Surface Infrastructure on its beam (port and starboard), but abaft of its beam.</i>

Commented [SW1]: Note this distance is still under discussion

## 2. Development Principles (should be read in conjunction with the glossary)

2.1 The Development Principles have been designed in accordance with the guidance contained within MGN 543. Whilst the MGN remains the primary guidance document the principles are a refinement of the guidance to specifically meet the requirements of Hornsea Three and its users. The Development Principles will be used to agree a layout post consent with the MMO in consultation with the MCA and TH.

Table 2.1: Development Principles.

Principle	Description
Principle 1	All Surface Infrastructure shall be located within the Hornsea Three Array Area and a defined Phase. No blade over sail or structural overhang is permitted outside of the Hornsea Three Array Area.
Principle 2	A minimum spacing of 1,000 metres (m) shall be maintained between the centre points of all Surface Infrastructure.
Principle 3	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.
Principle 4	As per MGN 543, SAR Access Lanes shall allow a SAR Asset (at altitudes below 500 feet) to enter the Hornsea Three Array Area from a position outside of the Hornsea Three Array Area (or outside of a Phase) and exit the other side of the Hornsea Three Array Area (or the other side of a Phase) without altering its heading or coming into Close Proximity to any Surface Infrastructure. If Hornsea Three are able to demonstrate that the blades can be rotated and parked (locked) clear of the SAR Access Lane the distance can then be measured from the external point of any structure.
Principle 5	If a Phased development, with different SAR Access Lane alignments in each phase, is constructed then Helicopter Refuge Areas (1,000m) will be required. Helicopter Refuge Areas shall be located between adjacent Phase boundaries and allow a SAR Asset to exit the current Phase and the Hornsea Three Array Area (in at least one direction) without coming into Close Proximity with any Surface Infrastructure.  Where a Phased development is not constructed, at least one Helicopter Refuge Area (1,000m), within the Hornsea Three Array Area (where SAR Access Lanes exceed 10nm) shall be required.
Principle 6	Dense boundaries are permitted either around the Hornsea Three Array Area or around individual Phases but they shall comply with Principles 2, 3 and 5.
Principle 7	Boundaries between adjacent Phases shall comply with Principles 1, 2 and 5.

Commented [KL2]: Revised text

Commented [KL3]: Principle still under discussion

Commented [SW4]: Suggest now adding principle 5 as it specifies the 1km gap.

Principle	Description
Principle 8	Surface Infrastructure within an Internal Development Lane shall be positioned to a tolerance of +/-150 m from the centre line of the Internal Development Lane. <u>It is agreed that this tolerance is a maximum and any micro-siting required due to sea bed obstructions etc., shall be included within the +/-150 m agreed.</u>
Principle 9	Surface Infrastructure placement is not permitted outside of the Internal Development Lanes, with the exception that blade over sail is allowed within Internal Development Lanes but shall comply with Principles 3 and 4.
Principle 10	SAR Access Lanes shall be principally determined by the boundary Surface Infrastructure, although dependent upon the spacing between the Internal Development Lane boundaries, there may be a requirement for more than one adjacent SAR Access Lane. Any adjacent SAR Access Lanes shall comply with Principles 3 and 4.
Principle 11	(a) Subject to (b), the position of Surface Infrastructure within a Perimeter Development Lane around the Hornsea Three Array Area and a Phase shall be arranged in straight lines (to a tolerance of $\pm 50\text{m}$ .) without any dangerously projecting peripheral structures, and shall comply with Principles 1 and 2.  (b) A Perimeter Development Lane around the Hornsea Three Array Area and a Phase may be arranged in a curved line where required to manage the interrelationship with existing or proposed offshore infrastructure, subject to the degree of curvature having been agreed with the MMO in consultation with the MCA and TH.
Principle 12	The western boundary of the Hornsea Three Array Area (and Phases adjacent to it) shall be aligned broadly parallel to the eastern boundaries of Hornsea Project One and Hornsea Project Two. The Defined Navigation Corridor shall also be no less than 3.91nm and is exempt from Principle 11. Micro siting shall not exceed $\pm 50\text{ m}$ on the western boundary development lane noting the minimum 3.91nm required for the defined navigation corridor. This principle will no longer apply when Hornsea Three is not considered an adjacent Project to Hornsea One and Two i.e. when it no longer needs to comply with minimum width parameters for Defined Navigational Corridors (ref PIANC guidance on vessel manoeuvring).
Principle 13	Any perimeter Surface Infrastructure should not project from the Hornsea Three Array Area (or Phases) so as to become isolated or exposed from the rest of the Surface Infrastructure.

Commented [KL5]: Principle still under discussion

Commented [KL6]: Revised Principle 11: agreed