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Subject: Hornsea Project Three (UK) Ltd response to Deadline 4 (Part 12)
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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 MCZ Guidance 2010.pdf](#)
[D4_HOW03_Appendix 53_WO_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](#)
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[D4_HOW03_Appendix 58_Indicative Arrav Layout.pdf](#)
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[D4_HOW03_Appendix 60_Draft CID 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](#)

Dear Kay, K-J

Please find attached the 12th instalment of documents.

Best regards,
Dr Dominika Chalder PIEMA
Environment and Consent Manager



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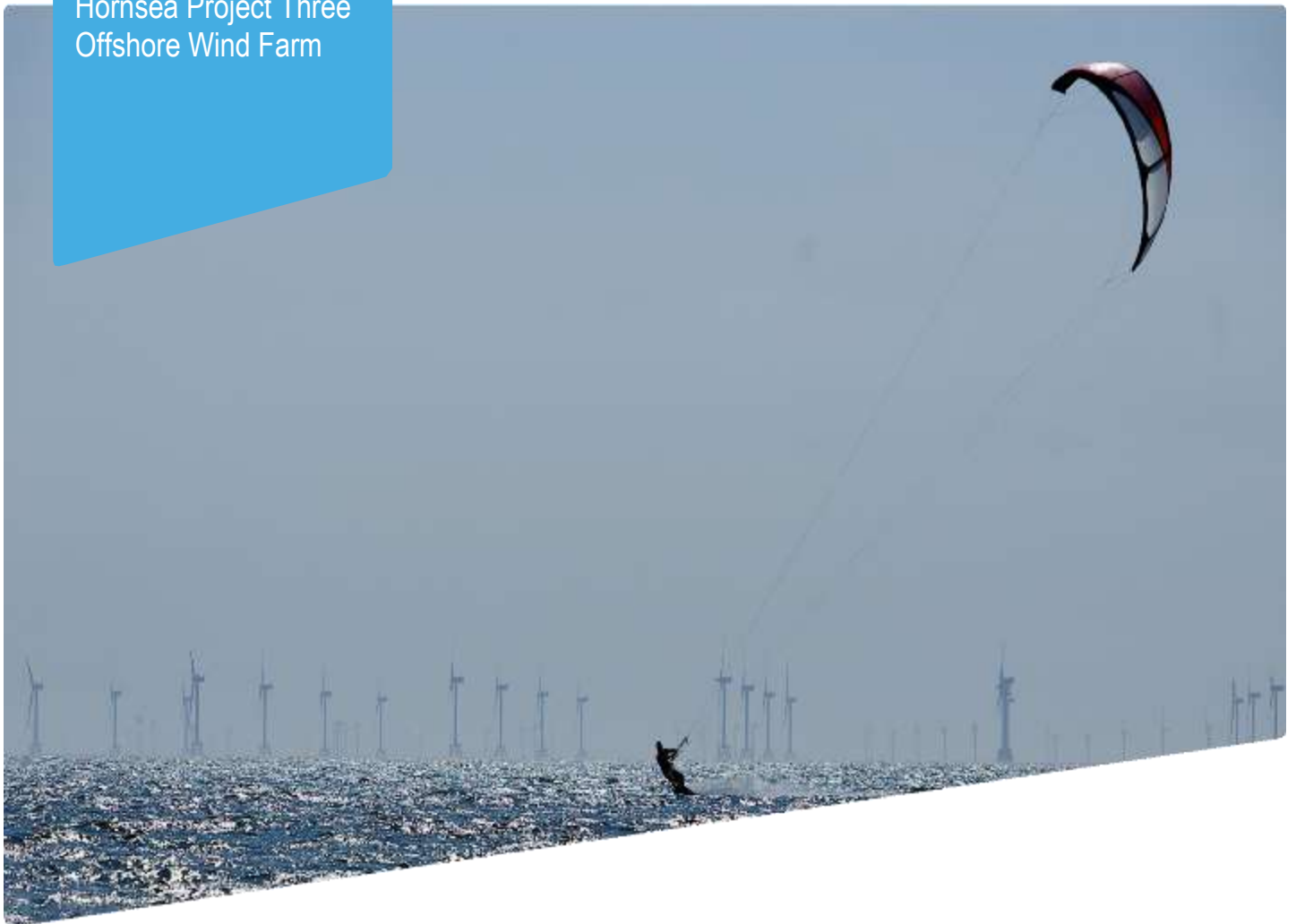
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Hornsea Project Three Offshore Wind Farm

Appendix 53 to Deadline 4 submission
Illustrative cable trench cross sections for ducted installation
In response to Ex.A Q2.1.3

Date: January 2019

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

Ducted method

In the ducted method, after excavation, plastic cable ducts are installed in the trench between the joint bays and covered with a suitable thermal backfill material (labelled in Figures 1 & 2 as 'imported backfill material') and previously excavated soils (labelled in Figures 1 & 2 as 'backfill material'). The cables are later pulled through the cable ducts from one joint bay to the adjacent joint bay.

For each HVAC cable system, three ducts are installed for the power cables and one duct for the fibre optic cables. For each HVDC cable system, two ducts are installed for the power cables and one duct for the fibre optic cables. HVAC ducts are normally installed in trefoil formation as shown in Figure 1, whereas HVDC ducts are installed in a flat formation with separation as shown in the Figure 2.

All dimensions in Figures 1 and 2 should be considered as indicative of a trench arrangement to accommodate the maximum design scenario for cables and ducts, for each installation configuration. Actual dimensions will vary depending upon the final cable and installation design.

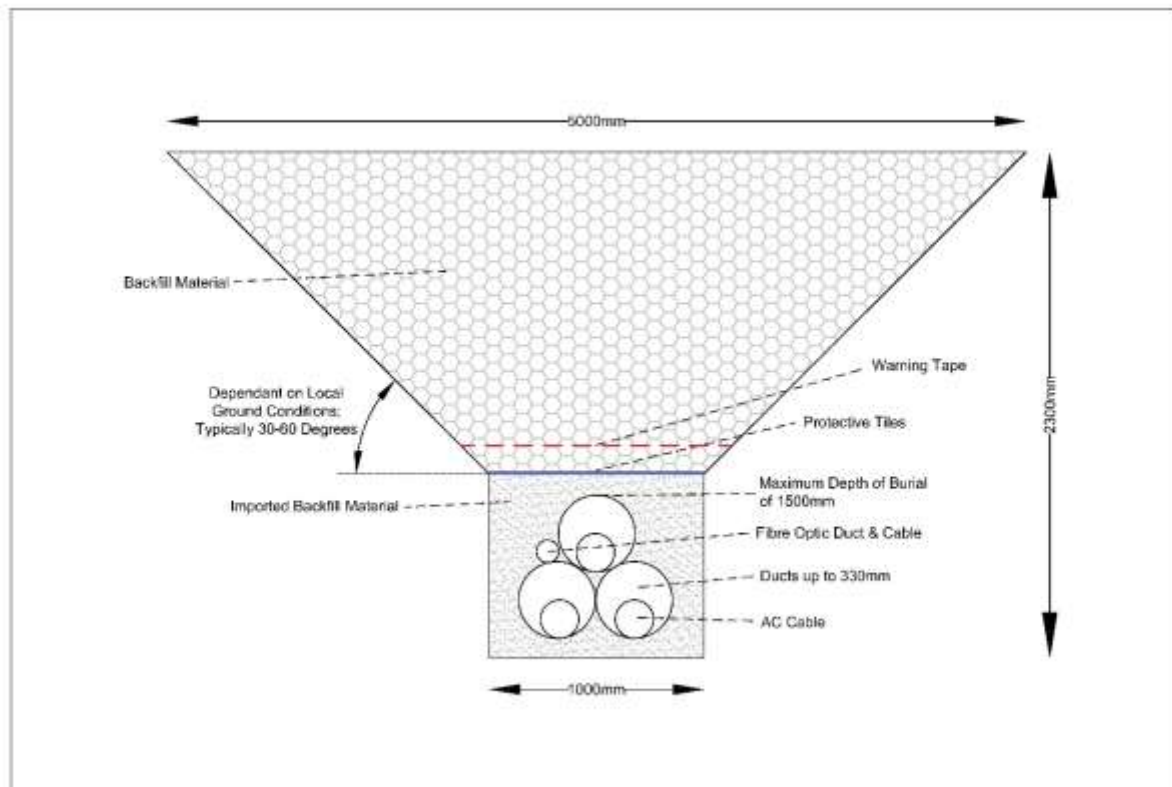


Figure 1. Ducted HVAC installation method in trefoil

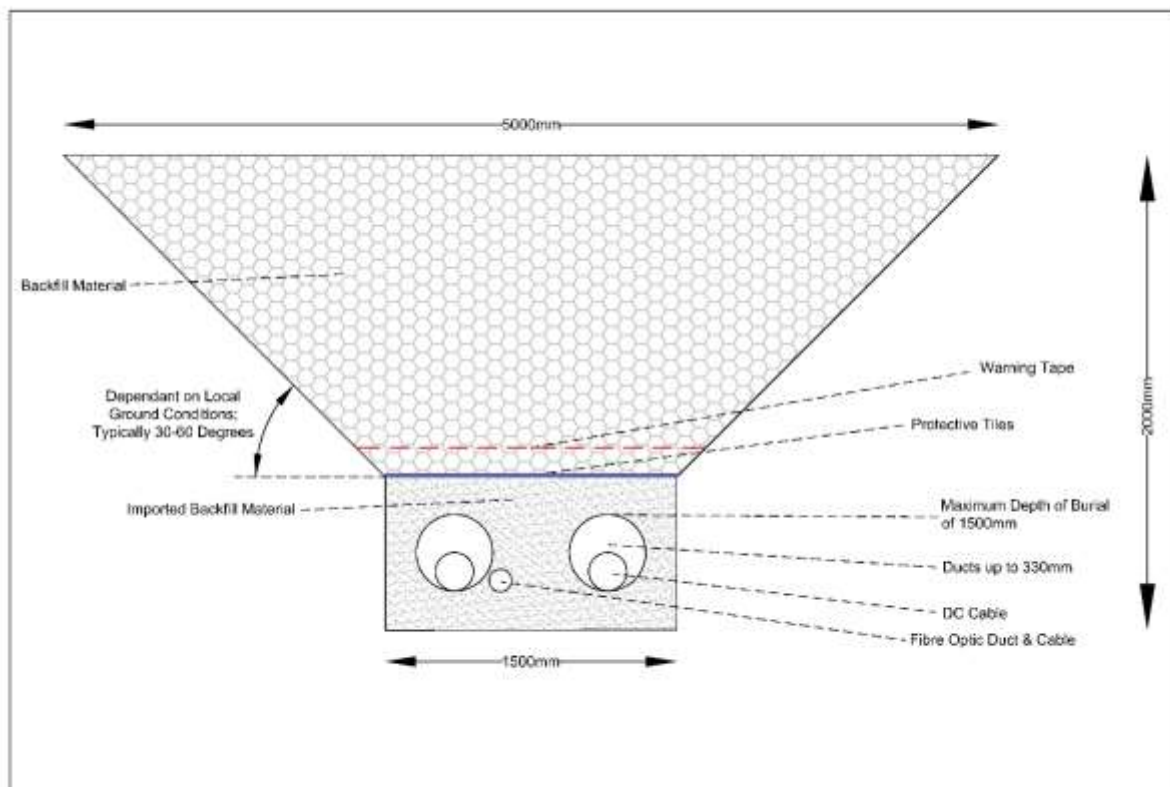


Figure 2. Ducted HVDC installation method in flat formation