



DOGGER BANK
WIND FARM



Dogger Bank C and Sofia Offshore Wind Farms Onshore Works

CoCP Appendix 4.7

Method Statement for Trenchless Installation

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1 Introduction

- 1 This high-level Method Statement for Horizontal Directional Drilling (HDD) has been produced to support the Code of Construction Practice (CoCP), and to fulfil Condition 9 of the Town and Country Planning Application #1 (TCPA #1, as defined further in the CoCP Glossary) and Requirement 27 of the Dogger Bank Teesside A & B Offshore Wind Farm Order 2015 (as amended) (the Development Consent Order, herein 'the DCO'). The measures set out within this Method Statement will be included within Stage-specific Construction Environmental Management Plans (CEMP) and detailed in Principal Contractor's Method Statements for each of the required Stages of work that involve HDD operations.
- 2 HDD is a steerable trenchless method of installing underground pipes, ducts and cables in a shallow arc along a prescribed bore path by using a surface launched drilling rig. HDD is an established method for duct installation where the more conventional trench installation is either unfeasible, or undesirable for environmental reasons.
- 3 Pipe diameters which can be installed range from approximately 50 mm to 1,000 mm. For High Voltage cable installations using HDD, it is normal to install ducts of multiples of the cable diameter to be pulled through the pipe or duct. The HDD could result in outer bore diameters of 450 mm to 750 mm, although smaller bore diameters could be possible, depending on the duct outer diameter.
- 4 During the HDD operations compounds will be required for launch and reception sites of the HDD unit. For each HDD, the cable route for the drilled (below-ground) sections, between the two end compounds, will typically be no wider than the compounds themselves. The landfall HDD will also need to be longer and deeper than at other sites, and thus the below-ground width may increase up to 250 m.
- 5 The typical activities required by an HDD operation are summarised below:
 - Site survey and bore planning;
 - Preparation of site for HDD operation;
 - HDD Drilling operation; and
 - Demobilisation from site.

2 Site Survey and Bore Planning

- 6 Prior to the commencement of HDD operations, a site survey will be conducted. A survey team will attend the site and map out existing services and bore paths. Site investigation borehole surveys may be undertaken to establish structural conditions for the drill path. The survey team will create an accurate plan and elevations of the proposed duct route. During the survey any buried services which are in close proximity to the route shall be clearly marked and documented on the survey drawings and where possible also on site.
- 7 A bore plan and profile will be created from the results of the survey. The plan will provide final information on the proposed bore arc including entrance and exit points, radius of curvature and the bore diameter required to accommodate the duct. The plan will be used to determine the actual length of the bore. Information on all buried services close to the bore path will also be contained within the bore plan and, where necessary, the bore plan will be amended to avoid these services. Calculations will be undertaken to verify anticipated settlement during installation of the HDD to ensure existing infrastructure is unaffected. To reduce risk of settlement the bore path will be increased in depth and in turn the cable spacing is required to be increased to

reduce the thermal effects of cable proximity. These are all factors that will influence the final HDD bore path design.

3 Preparation of Site for HDD Operation

- 8 The surveyors will set out the launch and reception pits to be used for the HDD operations. The dimensions and location of the launch and reception pits are carefully planned.
- 9 Existing services and infrastructure will be surveyed and marked out on the ground with positions of buried services confirmed with asset owners.
- 10 A suitable access haul road and working platform at the launch and reception sites will be constructed to allow the set-up of the drilling equipment and easy access by support vehicles. The requirements of both the launch site, where the drills are launched into the ground, and the reception sites where the drills exit the ground, are outlined below.
- 11 For the launch pit a rectangular area would be prepared and sized to suit the scale of the HDD operation being undertaken.
- 12 Access to the Site will be via an access road designed to accommodate heavily loaded vehicles and heavy plant. Generally, this will be the access road installed alongside the trench for the majority of the cable route, and including watercourse crossings via temporary vehicle bridges or similar.
- 13 A regular supply of fresh water shall be required on site at all times either via a reliable pumped source or frequent water tankers. If a continuous supply of water cannot be provided then storage tanks may be required on site for water and adequate space may be required for these.
- 14 Storage of slurry in a settling pond or disposal of excess slurry from site may be required. Therefore, a pit/settling pond shall be excavated at the launch site to contain the slurry arisings from the HDD bore. This excavation pit/settling pond will have a sufficient capacity to accommodate the drill arisings/slurry from the HDD operation being undertaken. Tankers may be required during the operation to control the levels of slurry and where necessary remove the slurry from the working area.
- 15 For an onshore reception pit, a site access and working platform will be constructed in a similar manner to the launch area. A slurry pit/settling pond will also be required to collect any slurry discharged from the drill hole.
- 16 Surface space requirements during operation will be sufficient to allow access by tankers to remove liquid slurry. A small working area is required for the drilling rig itself during operation; and larger area will be provided for the storage of associated drilling materials and equipment. Should additives need to be introduced to the bore then an area for a batching plant will be provided. Likewise, should recycling of the waste slurry be required then an area will also be allowed for a recycling plant and/or a settlement lagoon. A suitable working area will also be allowed for excavators to remove slurry from the ground surface.
- 17 At the receiving trench, working space will be required to construct the proposed receiving duct. This needs to be constructed prior to the HDD operation commencing.

4 HDD Drilling operation

- 18 Prior to drilling, the HDD rig will be elevated to the correct entry angle which will conform to the angle on the bore plan. Once the correct angle is achieved the rig will be anchored into position.
- 19 The HDD rig will first undertake a pilot bore using the drill head and involving the injection of drilling fluid. The bore is then carried out in intervals which will be determined by the Principal Contractor based on the specific HDD rig in use and the length of the bore to be installed.
- 20 The depth and direction of the pilot bore will be closely monitored by the operator to ensure that the bore follows the prescribed bore path. At each drill interval a locator operator will keep the drill operator informed of the location, pitch and roll of the drill head.
- 21 If there is a major divergence from the drill path, the operator will draw back the drill head to the point where the correct path was lost and re-drill in the correct direction.
- 22 When the pilot bore emerges from the ground in the reception pit, the drill head is removed and a reaming bit will be attached to the drill string. The reamer will be pulled back through the pilot hole, widening the bore. Dependent on the size of duct to be installed, several passes with the reamer may be necessary to gradually widen the bore. The reamed hole is pumped with drilling fluid down the stem of the drill string during reaming to maintain the integrity of the bore and prevent significant settlement or bore collapse.
- 23 When the bore hole has been reamed out to the correct diameter the back reamer is passed through the bore once or twice again to ensure that the hole is clear of any obstructions and that the slurry in the hole is well mixed.
- 24 Prior to installation into the bore, the duct itself is assembled to a single length longer than the bore path. Each duct shall be subject to an integrity test to ensure the assembly meets manufacturers requirements.
- 25 When the driller is satisfied that the bore is ready for the duct installation, a pull head is attached to the drill string at the reception pit via a swivel knuckle, to prevent rotation of the duct during the pullback operation. The duct is then attached to the pull head.
- 26 The duct is then pulled back through the bore toward the launch area by the drill rig. Once the duct is installed it will be capped off and sealed at each end ready for when the cable will be pulled through at a later date.
- 27 The working area and plant requirements associated with each specific HDD operation are linked to the size and length of the HDD bore being undertaken. The HDD size depends on the features of the crossing and different HDD rigs could be used for different obstacles. These details will be developed at the detailed design stage with the Principal Contractor and HDD sub-contractor.
- 28 It is estimated that ten HDD locations will be required, resulting in an overall cumulative length of around 2 km. The longest potential HDD section is estimated to be around 500 m although a typical HDD is expected to be in the order of 150-200 m.
- 29 Staffing requirements will also depend on the size and length of the HDD and are estimated to be 5 – 10 people at the launch site and 2 - 5 people at the receiving pit.

5 Landfall HDD

- 30 Where HDD is being used for a landfall cable system, HDDs are expected to be drilled from the launch pit to exit points in the sea bed. A reception pit would not be expected to be used as the HDD exit point is typically in the sub-tidal zone, although in some circumstances the exit point may be in the inter-tidal zone, or beach.
- 31 A typical cable landfall HDD installation involves drilling a pilot hole from behind the adjacent low-lying land at the shoreline down to the sub-tidal zone, reaming (to make the hole bigger), pulling or pushing a conduit pipe through the reamed hole, then pulling the landfall cable through the conduit. A separate HDD will be required for each export cable.

6 HDD Demobilisation

- 32 All the HDD working platforms will be removed and reinstated to a similar condition as prior to the works.