

Norfolk Boreas Offshore Wind Farm

Appendix 5.1

Onshore Scenario Comparison Table

Environmental Statement

Volume 3

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Photo: Ormonde Offshore Wind Farm

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Glossary of Acronyms

HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternate Current
HVDC	High Voltage Direct Current

Glossary of Terminology

Cable logistics area	Existing hardstanding area to allow the storage of cable drums and associated materials and to accommodate a site office, welfare facilities and associated temporary infrastructure to support the cable pulling works.
Cable pulling	Installation of cables within pre-installed ducts from jointing pits located along the onshore cable route.
Ducts	A duct is a length of underground piping, which is used to house electrical and communications cables.
Jointing pit	Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	Where the offshore cables come ashore at Happisburgh South.
Landfall compound	Compound at landfall within which HDD drilling would take place.
Link boxes	Underground chambers or above ground cabinets next to the cable trench housing low voltage electrical earthing links.
Mobilisation area	Areas approx. 100 x 100m used as access points to the running track for duct installation. Required to store equipment and provide welfare facilities. Located adjacent to the onshore cable route, accessible from local highways network suitable for the delivery of heavy and oversized materials and equipment.
Mobilisation zone	Area within which a mobilisation area would be located.
National Grid overhead line modifications	The works to be undertaken to complete the necessary modification to the existing 400kV overhead lines.
Necton National Grid substation	The grid connection location for Norfolk Boreas and Norfolk Vanguard.
Onshore cable route	The up to 35m working width within a 45m wide corridor which will contain the buried export cables as well as the temporary running track, topsoil storage and excavated material during construction.
Onshore project substation	A compound containing electrical equipment to enable connection to the National Grid. The substation will convert the exported power from HVDC to HVAC, to 400kV (grid voltage). This also contains equipment to help maintain stable grid voltage.
Running track	The track along the onshore cable route which the construction traffic would use to access workfronts.
Transition pit	Underground structures that house the joints between the offshore export cables and the onshore cables

1 Onshore Scenario Comparison Table

	Scenario 1 Norfolk Vanguard proceeds to construction and installs ducts and other shared enabling works for Norfolk Boreas	Scenario 2 Norfolk Vanguard does not proceed to construction
Landfall		
Landfall	Install landfall compounds, transition pits and ducts for export cables at the landfall using horizontal directional drilling (HDD).	Install landfall compounds, transition pits and ducts for export cables at the landfall using horizontal directional drilling (HDD).
Number of cable ducts at landfall	2	2
Number of transition pits at landfall	2	2
Onshore Cable Route		
Onshore cable route – pre-construction works	Majority completed by Norfolk Vanguard however some limited works may be required e.g. ecological preparations.	Pre-construction would be required, including: Road modifications; Hedge and tree netting / removal; Ecological preparations; Archaeological preparations; and Pre-construction drainage.
Onshore cable route – duct installation	Not required (installed by Norfolk Vanguard).	Install ducts along onshore cable route, from landfall transition pit to onshore substation, involving fencing, topsoil stripping and storage, trenches for ducts, a running track to deliver equipment to the installation site from mobilisation areas and storage areas for topsoil and subsoil.
Mobilisation areas	Not required.	Mobilisation areas to store equipment and provide welfare facilities during duct installation.
Crossings	Not required (installed by Norfolk Vanguard).	Crossing some features could require an alternative or amended duct installation approach i.e. hedgerows, underground services, roads or tracks, water courses (temporary dams, culverting) and trenchless crossings.
Trenchless crossings and associated compounds	Not required	Trenchless drill activities would be required at crossings with associated temporary crossing compounds either side.

Scenario 1 Norfolk Vanguard proceeds to construction and installs ducts and other shared enabling works for Norfolk Boreas		Scenario 2 Norfolk Vanguard does not proceed to construction
Onshore cable route – cable pulling	Deliver, pull and joint cables along onshore cable route in up to two phases. Use same access points as were used for Norfolk Vanguard cable pulling phases. Up to 20% of running track required to be retained or reinstalled to facilitate cable pulling.	Deliver, pull and joint cables along onshore cable route in up to two phases. Use site side access points and up to 20% of running track required to be reinstalled to facilitate cable pulling.
Cable pulling method	Pulled through installed ducts in a staged approach. Does not require trenches to be re-opened, however access to and from jointing pits would be required.	Pulled through installed ducts in a staged approach. Does not require trenches to be reopened, however access to and from jointing pits would be required.
Cable pulling	Installed in up to 2 phases	Installed in up to 2 phases
Link boxes	Approximately every 5km, on each circuit	Approximately every 5km, on each circuit
Jointing pits	Approximately every 800m, on each circuit	Approximately every 800m, on each circuit
Cable Logistics Area	During cable pulling a cable logistics area (area of existing hardstanding at Oulton) will allow storage of cable drums, associated materials and may accommodate site offices, welfare facilities and other associated infrastructure.	During cable pulling cable logistics area (area of existing hardstanding at Oulton) will allow storage of cable drums, associated materials and may accommodate site offices, welfare facilities and other associated infrastructure.
Construction and operation accesses	To facilitate safe ingress and egress from public highways to the cable route for cable pulling and maintenance purposes.	To facilitate safe ingress and egress from public highways to the cable route or mobilisation areas through temporary slip roads. Expected at each mobilisation area and intersections between public highway and cable route. Certain locations also used for cable pulling and maintenance purposes.
Operation and maintenance	Annual access to link boxes (would not require excavation as accessible from ground level) and emergency repairs along the easement if required.	Annual access to link boxes (would not require excavation as accessible from ground level) and emergency repairs along the easement if required.
Decommissioning	No decision – would be in line with relevant policy at the time. Likely cables removed from ducts and recycled, and transition pits and ducts sealed and left in situ.	No decision – would be in line with relevant policy at the time. Likely cables removed from ducts and recycled, and transition pits and ducts sealed and left in situ.
Onshore Project Substation		
Onshore project substation	1 required, with temporary construction compound. Access would be shared with Norfolk Vanguard and extended by approximately 300m.	1 required, with temporary construction compound. New junction and access from the A47 would be constructed.
Onshore project substation parameters	Length 300m Width 250m	Length 300m Width 250m

	Scenario 1 Norfolk Vanguard proceeds to construction and installs ducts and other shared enabling works for Norfolk Boreas	Scenario 2 Norfolk Vanguard does not proceed to construction
	Tallest equipment 19 m (reactor hall) and tallest structure (lightening protection) up to 25m	Tallest equipment 19 m (reactor hall) and tallest structure (lightening protection) up to 25m
Onshore project substation control buildings and converter hall	Control buildings and converter hall will typically be constructed from a steel frame with cladding panels.	Control buildings and converter hall will typically be constructed from a steel frame with cladding panels.
Onshore project substation pre-construction	Pre-construction would be required, including: Extend Norfolk Vanguard access road Hedge and tree netting / removal; Ecological preparations; Archaeological preparations; and Pre-construction drainage.	Pre-construction would be required, including: A47 junction improvement and installation of access road; Hedge and tree netting / removal; Ecological preparations; Archaeological preparations; and Pre-construction drainage.
Onshore project substation construction	Construct temporary construction compound and a mobilisation area at Spicers Corner, construct onshore substation and install electrical equipment.	Construct access road, construct temporary construction compound and a mobilisation area at Spicers Corner and construct onshore substation and install electrical equipment.
Onshore substation Operation and maintenance	Periodic maintenance visits (1 per week).	Periodic maintenance visits (1 per week).
Onshore substation Decommissioning	Would comply with relevant policy at the time.	Would comply with relevant policy at the time.
Onshore 400kV cables from onshore project substation to Necton National Grid substation	Excavation of trenches and laying of cables between the onshore project substation and Necton National Grid substation. Allowance for cables to be buried or ducted underground.	Excavation of trenches and laying of cables between the onshore project substation and Necton National Grid substation. Allowance for cables to be buried or not ducted underground.
National Grid Substation Extension and Modifications		
National Grid substation extension	Extend Necton National Grid substation in an easterly direction to provide 5 new Air Insulated Switchgear (AIS) bays (135m x 150m)	Extend Necton National Grid substation in a westerly direction to provide 7 new AIS bays (200m by 150m)
Busbar extension	135m busbar extension required.	200m busbar extension required.
400kV interconnection works	Install 400kV switchgear in user bays at Necton National Grid substation.	Install 400kV switchgear in user bays at Necton National Grid substation.
National Grid substation extension pre-construction	Pre-construction would be required, including: Hedge and tree netting / removal; Ecological preparations;	Pre-construction would be required, including: Hedge and tree netting / removal; Ecological preparations;

	Scenario 1 Norfolk Vanguard proceeds to construction and installs ducts and other shared enabling works for Norfolk Boreas	Scenario 2 Norfolk Vanguard does not proceed to construction
	Archaeological preparations; and Pre-construction drainage.	Archaeological preparations; and Pre-construction drainage.
National Grid substation extension construction	Construct temporary construction compound, install temporary access road from existing access, construct extension and install electrical equipment.	Construct temporary construction compound, install temporary access road from existing access, construct extension and install electrical equipment.
Overhead line modification works	Not required (completed by Norfolk Vanguard)	Removal of one existing overhead line tower and construction of two new permanent overhead towers, so the net gain in pylon towers is one.
Overhead line modifications Operation & Maintenance	Periodic maintenance visits (1 per week).	Periodic maintenance visits (1 per week).
Overhead line modifications decommissioning	Would comply with relevant policy at the time.	Would comply with relevant policy at the time.