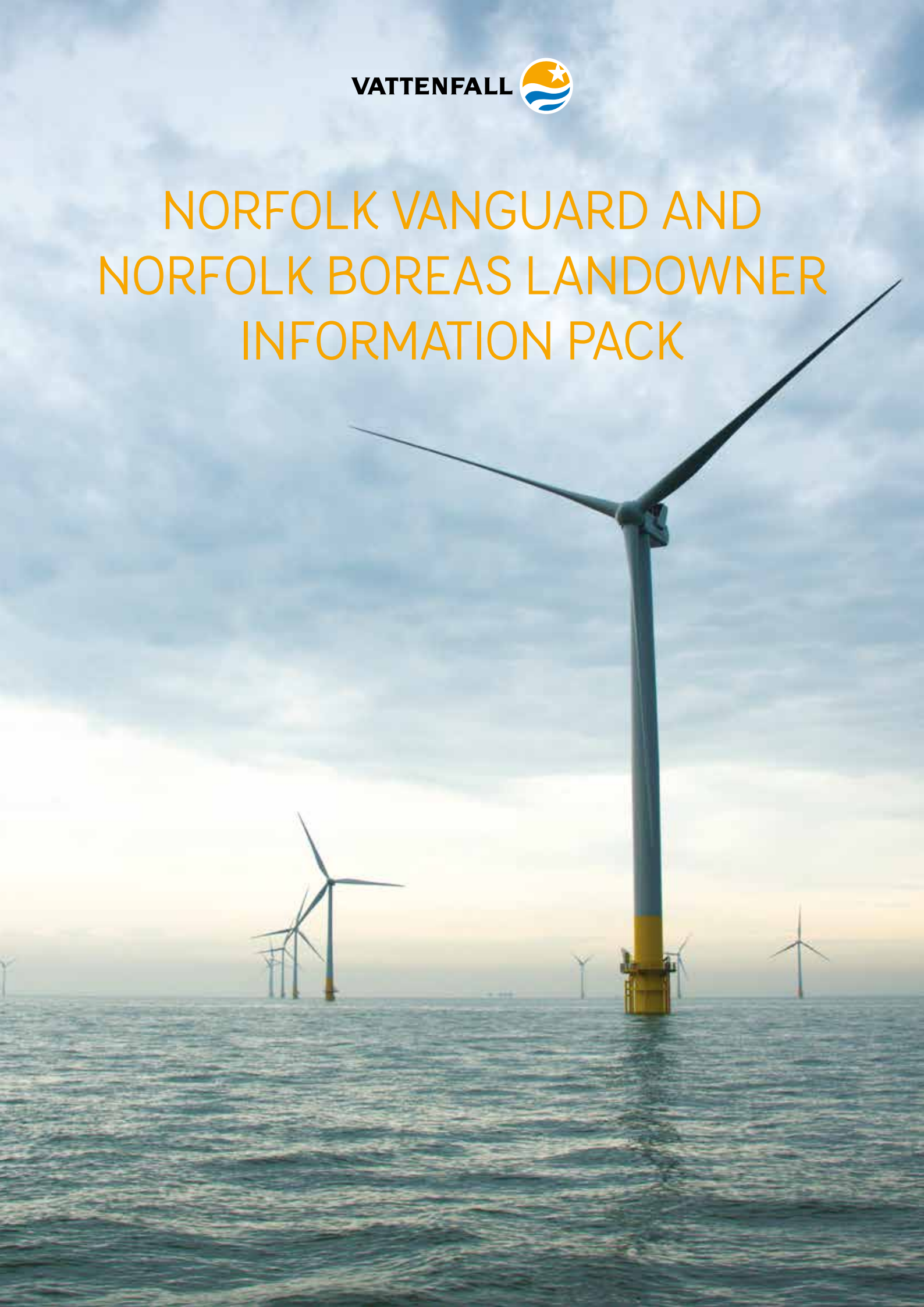


# NORFOLK VANGUARD AND NORFOLK BOREAS LANDOWNER INFORMATION PACK



# CABLE INSTALLATION - PHYSICAL REQUIREMENTS

## What project revisions have been announced in February 2018?

Vattenfall has announced significant design decisions about the Norfolk Vanguard wind farm proposals since the last version of the landowner pack was issued.

Among these revisions, aimed at delivering an environmentally sustainable project, generating climate smart, low cost green electricity, is the decision to deploy High Voltage Direct Current (HVDC) cable technology to connect Norfolk Vanguard and its sister project Norfolk Boreas to the UK's National Grid. This is a strategic decision to back HVDC for Vattenfall's Norfolk wind farms as the company believes the HVDC technology will be cost competitive with High Voltage Alternating Current (HVAC) in the early 2020's whilst being better for local people and the environment where onshore infrastructure is located.

Our revised Norfolk Vanguard proposals, take into account:

- Broad-ranging and in-depth feedback from a wide variety of local, regional and national communities and stakeholders, submitted during the Statutory Consultation period (November – December 2017)
- On-going discussions with expert topic groups and with landowners and occupiers
- On-going environmental assessments, which help us identify and avoid sensitive features, including early geophysical surveys to help detect buried archaeology
- Technical design revisions following a strategic review of technology development in electrical infrastructure.

The key design decisions include:

- Adoption of HVDC transmission connections which will avoid the need for cable relay stations near Happisburgh for Norfolk Vanguard and Norfolk Boreas
- Using HVDC transmission technology means a much narrower cable corridor throughout – offshore and onshore. The 45m wide onshore cable corridor running from landfall near Happisburgh to a substation near Necton, 60km away, allows Vattenfall to avoid sensitive sites including historical heritage, like buried archaeology near St Mary's Chapel, Kerdiston and a medieval moat north of Necton. (Vattenfall originally used a 100m corridor in line with HVAC requirements).
- Long range horizontal direction drilling (HDD) at landfall near Happisburgh – where power transmission cables from the offshore wind farm come ashore – will mean no works are required on the beach

- Vattenfall will avoid impacts on all county wildlife sites and a number of important local amenity and tourism sites by adding further sections of trenchless crossings. As a result, features like Paston Way, Knapton Cutting, the Marriott's Way and Wending Carr will be avoided
- Near Necton, part of the electrical assets comprising the HVDC Norfolk Vanguard substation would be enclosed within a building (the converter station). The footprint and maximum height of the HVDC Project Substation was provided in the PEIR and our Consultation Summary Document. Vattenfall will work with local residents and groups to minimise the substation's impact.

For more information, please see the February 2018 Newsletter <http://bit.ly/2oP4Oe0>, or our report: "Hearing Your Views – III" <http://bit.ly/2FquJTF>

You can also view an interactive map of our revised proposals for onshore works here: <http://bit.ly/2C6JTfr>

## Will HVAC or HVDC technology be used and why has this technology been selected?

The project has committed to the use of HVDC technology.

## Why are you going below ground rather than over ground on pylons?

The project has recognised the likely concerns the community will have with regards to long term visual impact of overhead lines and have chosen to bury the cables underground which will have no residual visual impact once installed.

## How wide is the cable corridor and what does it comprise?

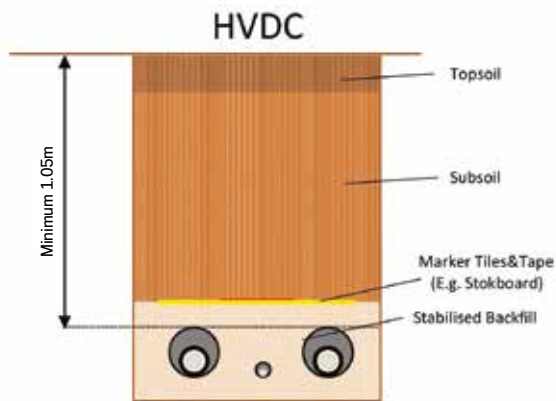
A temporary working width will be required during the construction phase which provides an area for storage of excavated soil and a temporary track alongside the trench for construction access purposes. The diagram to the right provides an indication of the areas required, showing the maximum temporary construction working width of 45m for Norfolk Vanguard and Norfolk Boreas. The maximum permanent easement that will be required is 20m.



Indicative HVDC Onshore Construction Working Width – Norfolk Vanguard and Norfolk Boreas

**How deep will the cables be laid and what is in the trench?**

The ducts will be laid to a minimum depth of 1.05m beneath the surface of the land in normal arable land and 1.2m in arable land which is subject to deep ploughing. This depth is standard electricity industry practice and will be sufficient to allow normal agricultural working practices to continue on the surface while still maintaining the efficiency of the electrical system. The diagram below shows an indicative cross section of the cable trench including ducts (within which cables are installed), stabilised backfill (around which the ducts are bedded) and warning marker tiles/tape above the ducts.



Trench Detail

**Will the cable route require any inspection chambers or link boxes? Will these be fenced/identified?**

Link boxes will be required at intervals along the length of the cable route where different sections of the cable are joined. The link boxes will be buried to ground level within an excavated pit with access provided via a secured access panel (manhole) or as an above ground cabinet. The link boxes can be demarcated in a number of ways through discussions with landowners at the construction stage.

Link boxes will be required for each cable circuit and typically every 5 km. Where possible, link boxes will be located on field boundaries to reduce the impact on farming operations. The exact siting of the joint bay and link box locations will be determined during the detailed design and preconstruction phase of the project.

Access will be required to the link boxes approximately once per annum for a short period of time (~1hour) to conduct testing.



Cable corridor post reinstatement, with link box at field boundary

**How will the cable route be marked and identified above ground?**

The cable alignment can be demarcated in a number of ways. One example technique would be using marker posts on the field boundaries, hedgerows and roads. Accurate GPS location data will also be recorded and made available to landowners who wish to work with GPS guided equipment. This will be confirmed at a later stage by Vattenfall.

**Will I be able to link my private wind turbine/solar farm into the cable?**

The cables, substation and any other infrastructure will be designed to only carry the power generated by the project and connect it to the national electricity network. Private connections will not be able to utilise the power or connect power to the grid.

**What will happen to the cables once the project is decommissioned?**

The cable ducts will remain in situ. The cables themselves may be removed in order to recycle the high-value materials.

Extraction of the cables from the ducts will be achieved through a reversal of the cable pulling and jointing method which is limited to small scale excavation at the joint locations only.

The cables will be extracted by excavating the joint bays, cutting the cable, pulling the cable from the ducts and reinstating the joint locations.



Cable pulling preparation

# CONSTRUCTION

## How long will the onshore project construction take?

Construction of Norfolk Vanguard and Norfolk Boreas offshore wind farms is subject to receiving two Development Consent Orders. Once all necessary consents, permissions and conditions are obtained, all onshore substation infrastructure (groundworks, roads and services, shared plant and buildings) and ducting for the onshore cables will be established prior to commissioning the first phase of the wind farm. Installation of cables and substation plant will then be carried out in sequence.

The overall programme of onshore construction activities across the entire route length is estimated to be as follows with indicative dates provided for reference, but are subject to change:

- 2020-2021: Onshore pre-construction works ~6 months (e.g. hedge removal, pre-construction drainage)
- 2022-2023: Main cable duct installation works, 2 x 9-month seasons (assumed shut down over the winter period due to adverse weather conditions)
- 2024-2025 (Norfolk Vanguard) & 2026-2027 (Norfolk Boreas): Cable pulling and jointing, ~6 months per project. (NB. We may want to retain the option to procure and install export cables 'just in time' for each phase of the wind farm, in which case we would be returning (approximately annually) to pull in cables.)
- 2022-2023 (Norfolk Vanguard) & 2024-2025 (Norfolk Boreas): Main works for substation infrastructure - ~2 years per project

We have designed the cable route to allow the installation of Norfolk Boreas offshore wind farm cable ducts at the same time as Norfolk Vanguard offshore wind farm cable ducts, to minimise the length of time for landowner disruption and maximise installation efficiency.

## How long will be needed in any particular area and what is the proposed construction procedure for cable installation?

In any one location along the cable route where standard open trenched installation is being conducted, excavations are likely to be in the order of 1 week's activity per 150m. The running track will be utilised for more extended periods during the duct installation works to allow ongoing access to other locations along the cable route whilst minimising impacts to the local highways network.

The process of duct installation in any given location can be summarised as:

- Mark out and fence off
- Topsoil strip and store
- Creation of running track (may require bog mats, aggregate or similar dependent on ground conditions)
- Excavate trench and store subsoil (separate to topsoil)
- Lay ducts and associated materials in trench
- Reinststate subsoil within trench

Once the ducts are installed, topsoil is reinstated and the land returned to the landowner. Limited disruption will be required at joint locations (approximately every 500m – 1000m) in subsequent years to allow cable pulls. At these locations a joint bay will be excavated and cables pulled through the installed ducts.

The following storyboard provides a case study of a recent Vattenfall UK onshore wind farm open trench duct installation and subsequent cable pulling activities.



1. Topsoil Strip and Store



3. Ducts Covered and Protective Marker Tiles Laid



2. Excavate Trench. Subsoil Store separate to topsoil store and lay ducts



4. Replace Subsoil



5. Reinstate Topsoil

**What will the working hours be? Will it be 7 days per week?**

Working hours will normally be 7am to 7pm five days per week, however there may be certain exceptions which will be discussed with the local authorities (for example, larger components may be best delivered outside these hours to avoid traffic impacts and limited 7 day 24hr working may be required during trenchless crossing activities).

**Will there be mobilisation areas, how large and how many?**

It is standard practice to have mobilisation areas to facilitate the construction works. Primary mobilisation areas (PMAs) are approximately 100m x 100m and placed at strategically accessible locations from the highways network to service lengths of the cable route up to approximately 5 km, meaning there will be in the order of 14 primary mobilisation areas along the cable route.

**What is a trenchless crossing?**

At a number of locations along the route the cables are required to be installed underneath linear features such as railways and large watercourses which are not suitable to be crossed using open trench excavation methods.

At these locations, a trenchless installation method such as microtunnelling, auger boring or most likely horizontal directional drilling (HDD) will be employed. This method allows a surface to surface drilling approach for installation of the cable ducts. A compound of up to 150m x 50m will be required on one side of the crossing to accommodate the necessary drilling equipment at these locations with a further 100m x 50m receptor compound to be accommodated at the opposite side of the crossing. The crossing method employed will determine the additional temporary land required to facilitate the works.

The timescale for any trenchless works will be determined by ground conditions and length of drill required, although can be expected to be in the order of 2 months to 6 months from mobilisation to demobilisation.



6. Excavate Joint Pit and Conduct Cable Pull (Post Duct Installation and Reinstatement)



7. Pull cables into ducts

The following storyboard provides an indication of a HDD installation process at the landfall, with similar techniques available for land to land crossings within the onshore cable route.



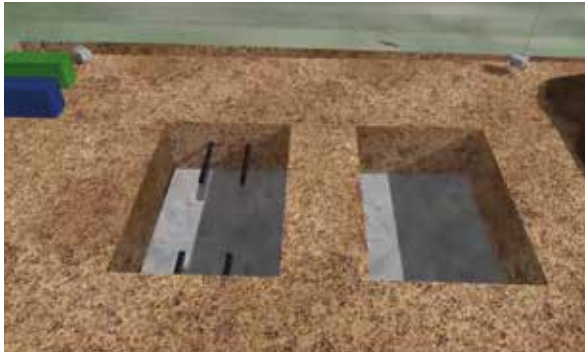
1. Site establishment including topsoil strip and store



4. Pilot hole reamed (widened) and cable ducting pulled through from reception pit to drilling site



2. Excavation of joint pit, introduction of HDD rig and begin pilot bore



5. Cable pulled through ducting and jointed



3. Pilot bore exits at reception pit



6. Site reinstated



Example HDD rig



### **How much traffic will it generate and what type of vehicles?**

The installation of the onshore ducts and the construction of the onshore project substation and National Grid substation extension would create a substantial amount of construction traffic. The majority of heavy goods vehicle movements will be associated with the delivery of materials, plant and equipment. Key locations will be identified along the route that can accommodate the larger delivery vehicles and these will be located adjacent to highways which have the capacity to deal with this type of traffic. Otherwise vans and 4x4 vehicles will be used to transport light equipment and personnel around the site.

All vehicle movements are subject to a detailed traffic management plan agreed in advance with the relevant local authorities and any movements on the Strategic Road Network (SRN) would be agreed in advance with Highways England.

Further details can be found in the PEIR Traffic and Transport Chapter 24<sup>1</sup> available on the project website: [www.vattenfall.co.uk/norfolkvanguard](http://www.vattenfall.co.uk/norfolkvanguard)

The majority of the components and equipment relating to offshore construction will be transported to site by sea.

### **Will there be road closures / traffic management?**

It will be necessary to have road closures and traffic management for periods of time in order to complete the works. Efforts will be made to avoid or minimise traffic disruption.

Where road crossings are unavoidable, Vattenfall will identify the most appropriate crossing technique to minimise the level of disruption. For crossings where the level of disruption to traffic would be particularly problematic, HDD or other trenchless techniques will be considered.

We will be consulting closely with the local council and Highways England regarding any road closures and appropriate traffic management measures, and will detail our proposals in a Travel Plan (TP) and a Construction Traffic Management Plan (CTMP).

### **How many large vehicle movements will there be and over what period?**

Traffic movements are considered as part of the Environmental Impact Assessment (EIA) and will be discussed with Highways England and the local authority.

### **Will the works be noisy? Dusty? Smelly?**

To avoid or minimise construction related impacts (such as noise disturbance, dust emissions and odour) the following key principles have been considered where practical in identifying the onshore cable route and associated onshore infrastructure, for example:

- Reducing proximity to residential dwellings;
- Reducing proximity to historic buildings;
- Minimising impacts to local residents in relation to access to services and road usage, including footpath closures;
- Installing cables within open agricultural land where possible; and
- Minimising requirement for complex crossing arrangements, e.g. road, river and rail crossings.

Through the EIA we are considering any potential impacts in relation to noise, dust and odour as a result of the construction or operation of the project.

We will propose specific mitigation measures to be put in place which would need to be agreed with the Environmental Health Officer and relevant local authorities.

Vattenfall are committed to working closely with the local authorities to reduce disturbance to the general public throughout the course of the project.

Further details can be found in the PEIR Noise and Vibration Chapter 25 available on the project website: [www.vattenfall.co.uk/norfolkvanguard](http://www.vattenfall.co.uk/norfolkvanguard)

### **Who will benefit and what will the local community (ies) gain from this?**

As a leading energy company, Vattenfall is guided by principles of sustainable development. This means we actively seek opportunities for our investments to create lasting, meaningful benefits and particularly to deliver solutions for people living in the areas we operate. Norfolk is a unique place with its own identity and priorities. We'd like the local experts, people who live, work and play here, to tell us what is important for Norfolk's future – its environment, people and economy. We are excited to begin a conversation with local people and stakeholders, which over the next months and years gives us a chance to explore together opportunities for bringing meaningful, lasting benefit to the local area.

We will be able to provide some detail about specific local direct and indirect economic benefits for Norfolk after completing our impact assessments of the offshore wind farm on the local economy.

---

<sup>1</sup> Please note the description of traffic and transport considerations within the PEIR refer to the greatest possible impacts resulting from the design envelope considered by the PEIR (HVAC technology). As we are now committed to an HVDC project, traffic and transport impacts will be revised to reflect the need for less construction works.

# IMPACT ON LAND USE DURING AND POST CONSTRUCTION

## **What effect will all these high voltage cables have on people using the land?**

The following key principles in relation to landowners will be incorporated where practical in the final site selection of the buried onshore cable route and associated onshore infrastructure:

- Install cables within open agricultural land where possible
- Avoid rendering parcels of agricultural land inaccessible during construction;
- Avoid areas of important habitat, trees, ponds and agricultural ditches.
- Minimise impacts on agricultural practices and access;
- Reduce proximity to residential dwellings; and
- Minimise impacts to local residents in relation to access to services and road usage, including footpath closures.

We will be working closely with landowners to identify site specific issues and determine the most appropriate actions and mitigations.

## **Will I be able to cross the cable corridor with agricultural vehicles during and after construction?**

During construction the working corridor will be fenced off for the purposes of safety and security. However, we appreciate that farming occupiers will require access over the working corridor to access severed areas of fields and farms and this should generally be possible for the majority of the time and we will work with landowners to minimise disruption to their operations wherever possible. However access will be limited when the trench excavations are being conducted. Provision for these crossing points can be discussed at a later stage once detailed design has been completed. After construction, the land will be reinstated to its previous condition and farming operations can continue as they did prior to construction.

## **Will I still be able to farm the land above the cable corridor?**

Once construction is complete and the land has been reinstated you will be able to continue with normal agricultural practices. There will be restrictive covenants in place, for your safety and the safety of the cable infrastructure, which will restrict and regulate procedures for deeper farming practices. There will also be restrictions in place to restrict the construction of buildings and planting of deep rooted plant species along the cable corridor. This is common with other infrastructure projects of this type.

## **What will you do with the topsoil, how will you avoid contaminating topsoil with subsoil?**

Topsoil will be stripped back as one of the first stages of construction and stored in a tidy stockpile at the edge of the cable working area. This will also be sprayed as required to avoid weed contamination. The project team understand the importance of keeping topsoil and subsoil separate to prevent contamination. Reference is made to the 'Construction Code of Practice for the Sustainable Use of Soils on Construction Sites' – DEFRA.

A Soil Management Plan (SMP), including construction method statements for soil handling will be produced and agreed with the relevant regulator, in advance of the works. This would be completed pre-construction once an earthworks contractor has been appointed and detailed earthworks phasing information is available.

The sectionalised duct installation process (~150m/week) is proposed to minimise the period of time that the soil is excavated.

## **What about land drains and field under drainage?**

Agricultural drainage specialists will prepare pre-construction and post-construction drainage designs. Generally these will aim to intercept the existing land drains and drain the working width. The post construction drainage and reinstatement will seek to restore the land to the condition it was in prior to the works.

We will be asking all landowners for any existing records in relation to under-field drainage and will seek to discuss the land drainage proposals with the landowners and tenants affected.

### **What about bio-security?**

There is potential for biological contamination between different agricultural land holdings and between individual fields, particularly where tracked vehicles are crossing between field and landowner boundaries.

Biosecurity is the prevention of disease causing agents entering or leaving any place. It involves a number of measures and protocols designed to prevent disease causing agents from entering or leaving a property and being spread.

Defra has identified a number of best practice measures to minimise the risk of spreading disease. These measures include but are not limited to:

- Agreeing access arrangements with the landowner in advance of any construction works taking place;
- Minimising where possible the movements of people, vehicles or equipment into areas where farm animals are kept, including fields, sheds, markets or other holding areas; and
- Cleaning equipment upon arrival and departure

### **How will the works affect footpaths / bridleways?**

Wherever possible the cable route seeks to minimise impacts to local residents in relation to access to services and road usage, including footpath closures.

Should the development receive approval, during the construction phase it may be necessary to close or divert certain public rights of way. Any closures or diversions would need to be agreed with the local public rights of way officer. There will be no requirement to close public rights of way while pre-construction surveys are being completed.

### **How will you get through hedges, trees and will they be replaced?**

Wherever possible, the cable route seeks to minimise the number of hedgerow crossings, utilising existing gaps in field boundaries if possible. Trees have also been avoided where possible.

As part of the EIA, Vattenfall is undertaking ecological and habitat surveys to characterise the existing environment and identify the most environmentally acceptable and technically feasible locations for the cable route and associated onshore infrastructure.

Where hedgerow crossings are unavoidable, Vattenfall will identify opportunities to reduce the width of the cable corridor to minimise the amount of hedgerow removal. Any hedgerow removal will result in hedgerow replanting to match those existing. And temporary fencing will be erected around the newly planted section of hedge in accordance with best industry practice.

We will be consulting closely with the local council and Natural England regarding any hedgerow crossings and appropriate mitigation will be identified.

In addition, depending on the locations of the onshore infrastructure, Vattenfall is exploring options for onsite and offsite screening proposals including planting. Any habitat creation as part of the proposals would enhance the existing landscape features and improve biodiversity within and around the project.

Further details can be found in the PEIR Ecology Chapter 22 available on the project website: [www.vattenfall.co.uk/norfolkvanguard](http://www.vattenfall.co.uk/norfolkvanguard)

### **Will you affect any watercourses?**

Wherever possible, the cable route seeks to avoid impacting watercourses and waterbodies. We will take measures to ensure that watercourses are not polluted by any run-off from the works.

Where water crossings are unavoidable, these are being assessed on a case by case basis. Vattenfall will seek to identify the most appropriate crossing technique in each case. We will be consulting closely with the local authority and the Environment Agency regarding any watercourse crossings and appropriate mitigation will be identified.

Further details can be found in the PEIR Water Resources and Flood Risk Chapter 20 available on the project website: [www.vattenfall.co.uk/norfolkvanguard](http://www.vattenfall.co.uk/norfolkvanguard)

### **What effect will the cables have on our GPS equipment?**

The cables will have no effect on GPS equipment.

# COMMERCIAL

## **What rights will you be seeking for the cable?**

Vattenfall will be seeking an easement with landowners for the underground cable rights. This is to allow; electricity to run through the cable, the cable to remain in the ground, access to the cable for repairs and maintenance and restrictions on the surface use (noting that standard farming operations can continue).

## **What about ELS / HLS / OLS agreements and payments and BPS payments?**

Agri – Environment agreements should not be prejudiced as Vattenfall and its agents will, on behalf of the land user, obtain all necessary permissions and derogations from Natural England. All business losses directly caused as a consequence of the construction and operation of the project will be compensated, including losses from agricultural subsidy payment schemes (BPS).

## **Will you pay my agents / solicitors fees?**

We will pay for land agent fees in relation to survey access where a licence is requested for intrusive works. These payments will be capped at £500 per landowner.

For discussions regarding Heads of Terms (HoTs) for an option agreement we will meet reasonable land agent fees up to a cap per landowner. Details of the cap will be explained within the HoTs to be issued in the coming weeks.

## **As a landowner, what compensation will I receive?**

As a landowner you will be compensated for the land/ rights sought across your land. Vattenfall's preferred approach is to reach an agreement with all affected landowners in order to secure the land and rights required for the project before any statutory powers are utilised. Compensation will also be payable for any temporary occupation of land along with any crop losses and other direct disturbances to business operations.

## **Will you be able to compulsorily acquire the rights/land?**

As above it is Vattenfall's preferred approach and intention to reach agreements with all affected landowners in order to acquire the necessary land/ rights. However we appreciate that for a project of this size and length this will not always be possible. Through the DCO application, compulsory powers will be sought in order to acquire any land/rights where attempts to reach an agreement have been unsuccessful.

## **Landowner enquiry?**

### **Please contact Consent Solutions**

**Key Landowner contact:** Bob McCarthy

**Mobile:** 07787 783517

**Phone:** 01223 859221

**Email:** vattenfallinnorfolk@consentsolutions.com

@Vattenfalluk  
www.vattenfall.co.uk/norfolkvanguard

