Royal HaskoningDHV
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Norfolk Boreas Offshore Wind Farm

Consultation Report

Appendix 9.6 Norfolk Vanguard Socio-economic & Tourism outgoing documents

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Norfolk Vanguard Offshore Wind Farm

Environmental Impact Assessment

Socio-economics and Tourism Method Statement

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This method statement has been prepared by Royal HaskoningDHV on behalf of Vattenfall Wind Power Limited (VWPL) in order to build upon the information provided within the Norfolk Vanguard Environmental Impact Assessment (EIA) Scoping Report. It has been produced following a full review of the Scoping Opinion provided by the Planning Inspectorate. All content and material within this document is draft for stakeholder consultation purposes, within the Evidence Plan Process.

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1 INTRODUCTION

1. The purpose of this method statement is to build upon the information provided within the Norfolk Vanguard Environmental Impact Assessment (EIA) Scoping Report, in outlining the proposed approach to be taken and considerations to be made in the assessment of socio-economic effects of the proposed development.

2. This method statement has been produced following a full review of the Scoping Opinion provided by the Planning Inspectorate.

1.1 Background

3. A Scoping Report for the Norfolk Vanguard Environmental Impact Assessment (EIA) was submitted to the Planning Inspectorate on the 3rd October 2016. Further background information on the project can be found in the Scoping Report which is available at:

https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010079/EN010079-000022-Scoping%20Report.pdf

4. The Scoping Opinion was received on the 11th November 2016 and can be found at:

https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010079/EN010079-000018-Scoping%20Opinion.pdf.

1.2 Norfolk Vanguard Programme

1.2.1 DCO Programme

- Scoping Request submission - 03/10/16 (complete)
- Preliminary Environmental Information submission - Q4 2017
- Environmental Statement and DCO submission - Q2 2018

1.2.2 Evidence Plan Process Programme

5. The Evidence Plan Terms of Reference provides an overview of the Evidence Plan Process and expected logistics, below is a summary of anticipated meetings:

- Steering Group meeting -21/03/16 (complete)
- Steering Group meeting - 20/09/16 (complete)
- Post-scoping Expert Topic Group meetings
  - Discuss method statements and Project Design Statement - Q1 2017

- Expert Topic Group and Steering Group meetings as required - 2017
  - To be determined by the relevant groups based on issues raised
- PEIR Expert Topic Group and Steering Group meetings - Q4 2017/ - Q1 2018
  - To discuss the findings of the PEI (before or after submission)
- Pre-submission Expert Topic Group and Steering Group meetings - Q1/Q2 2018
  - To discuss updates to the ES following PEI consultation

1.2.3 Survey Programme

6. Currently there is no intention to carry out specific surveys in relation to the socio-economic environment and potential impacts. As detailed in the Scoping Opinion, there will be a need to collect data on tourist accommodation. It is proposed that these data will be collected using telephone questionnaires of a random selection of accommodation providers within the zone of influence.

7. In order to extract more information (than just number of available rooms), a sample of providers will be asked several additional questions regarding average occupancy, seasonality of occupancy, and a general view regarding any positive or negative perceptions of the potential for increased demand for temporary workforce accommodation.

2 PROJECT DESCRIPTION

2.1 Site Selection Update

8. Further to the site selection information provided within the Norfolk Vanguard Scoping Report (Royal HaskoningDHV, 2016), additional site selection work has been undertaken to refine the locations of the onshore infrastructure. The Norfolk Vanguard EIA Scoping Report identified search areas for the onshore infrastructure which were identified following constraints mapping to avoid or minimise potential impacts (e.g. noise, visual, landscape, traffic, human health and socio-economic impacts). Further data review has been undertaken to understand the engineering and environmental constraints within the search areas identified. The public drop-in-exhibitions in October 2016 and Scoping Opinion have also contributed to our broader understanding of local constraints and opportunities, feeding into the ongoing site selection and development of the EIA strategy. The project areas shown in Figure 1 are a draft for stakeholder consultation only and are provided in confidence. Equivalent information will be presented during open drop-in-exhibitions in March 2017, providing an opportunity for local people and the wider public to understand the way in which their feedback, as well as the Scoping Opinion and has influenced our design. Given the broad range and complexity of the factors influencing site selection and the scale of the area under discussion, it is our intention that local people and interested parties view the map for the first time, with Vattenfall and suitably qualified experts on hand. This enables a meaningful discussion of the proposed options and enables participants to refer directly to points of reference they may wish to discuss. During the March drop-in exhibitions, participants will also be invited to provide feedback on the latest design.

9. There are currently three landfall options with associated cable relay station search zones as well as an onshore substation search zone in proximity to the existing Necton 400kV National Grid substation (the grid connection point). A 200m wide cable corridor has been identified, within which the cable route will be located (see cable route parameters in Section 2.2.1). Ongoing public and stakeholder consultation as well as initial EIA data collection will be used to inform selection of final locations for the EIA and DCO application, with the aim to further avoid sensitive areas. Impacts that cannot be avoided through site selection will aim to be reduced through sensitive siting, alternative engineering solutions (mitigation by design) and additional mitigation measures where possible. Mitigation options will be developed in consultation with stakeholders.

2.1.1 Landfall Zones

10. The landfall search area was presented in the Scoping Report as Figure 1.3. This has been refined to three landfalls options (Zone 8), Bacton Green, Walcott Gap and Happisburgh South, following studies on the engineering feasibility of horizontal directional drilling (HDD). The two northern landfalls have the advantage that related onshore infrastructure (the cable relay station) could be placed close to the existing Bacton gas terminal in what is already an industrialised area thereby reducing landscape impacts, a preference stated by many at the public drop-in exhibitions. Discussions with the owners and operators of the gas terminal will inform the final landfall location.

11. Both northern options would require offshore cabling through the Cromer Shoal Chalk Beds Marine Conservation Zone (MCZ) and concerns have been expressed by members of the public and a number of statutory authorities about impacts on the MCZ. Information from the offshore cable corridor geophysical and benthic survey from within the Cromer Shoal Chalk Beds MCZ will be reviewed to understand the extent of designated features and therefore the feasibility of installing offshore cables. Data on coastal erosion, including estimates of coastline movement over the life time of the wind farm, and the likelihood of archaeological finds, will be reviewed to understand the feasibility of a landfall south of Happisburgh. This site is outside the MCZ but siting the required onshore infrastructure within a rural location would require careful consideration.

2.1.2 Cable Relay Station Options

12. The cable relay station search area was presented in the Scoping Report as Figure 1.6. Refined search zones (Zone 7) have been defined based on the initial constraints mapping work, the updated landfall site selection and initial consultation. A number of receptors and impacts have been considered during the selection of the scoping search area and the refined search zones, particularly noise and visual impacts, ecology traffic, human health and socio-economic impacts. As with the landfall location, discussions with the owners of the gas terminal will inform the final landfall location.

2.1.3 Onshore Cable Route

13. The onshore cable corridor search area was presented in the Scoping Report (Royal HaskoningDHV, 2016) as Figure 1.5. The route shown on Figure 1 (Zone 4) is considered to be the shortest possible route (thereby minimising disturbance impacts) whilst also aiming to avoiding main residential areas and impacts to landscape and nature conservation designations where possible.

14. Routes in the north of the scoping search area were discounted owing to the presence of existing gas pipelines and the cables from the Dudgeon Offshore Wind Farm which significantly affected the number of complex crossings that would be required. The proposed route skirts around the main towns of North Walsham, Aylsham, Reepham and Dereham. The route corridor is currently 200m wide thereby allowing for further micro-siting following feedback from the public drop-in-exhibitions planned for March 2017 and information from planned survey work.

2.1.4 Substation Zone

15. The onshore substation search area, comprising five sectors, was presented in the Scoping Report (Royal HaskoningDHV, 2016) as Figure 1.4. Public consultation during the drop-in exhibitions indicated Sector 5 (to the south of the existing Necton 400kV National Grid substation) and Sector 1 (to the east) would be the best options in this location.

16. Sectors 2, 3 and 4 were discounted due to the proximity of the residential areas of Necton, Little Dunham, Great Fransham and Little Fransham.

17. Sector 1 was maintained as an option due to the existing woodland and topography of this area which could provide screening (in addition to project screening mitigation) which may limit visual impacts. Additional access would however be required for this sector.

18. Sector 5 was maintained as an option on the basis of keeping all existing and proposed development together, the lack of housing in this sector and good access from the A47. However concerns were raised regarding the ongoing industrialisation of the area.

19. The refined substation search zone (Zone 3) includes the parts of Sectors 1 and 5, south of the A47 and south of the existing overhead line.

20. A search area for underground cables has also been delineated (the western end of Zone 4) which is required to connect the substation located within Zone 3 to the existing Necton 400kV National Grid substation.

2.1.5 Extension to the Existing Necton 400kV National Grid Extension

21. Since completion of the Norfolk Vanguard EIA Scoping Report (Royal HaskoningDHV, 2016) a decision has been made by the VWPL to include the required extension works to the existing Necton 400kV National Grid substation within the EIA and DCO application for Norfolk Vanguard. The aim of this approach is to enable a more transparent impact assessment and allow the development of more effective mitigation.

22. Appropriate search zones for the extension works have been developed in consultation with National Grid, including:

- Zone 1 - Land adjacent to the existing substation which could accommodate extension to the existing busbars (see Section 2.2.1.5).
- Zone 2 - Land where overhead line realignment works maybe required adjacent to the existing National Grid substation (see Section 2.2.1.5).

23. VWPL will work closely with National Grid to ensure the design of the extension works is appropriate.

2.1.6 Norfolk Boreas

24. Since completion of the Norfolk Vanguard EIA Scoping Report (Royal HaskoningDHV, 2016) a grid connection agreement has been granted by National Grid for Norfolk Boreas at the existing Necton 400kV National Grid substation. Therefore the Norfolk Vanguard EIA will include the option for Norfolk Boreas cable ducts to be installed at the same time as Norfolk Vanguard.

2.2 Indicative Worst Case Scenarios

25. The following sections set out the indicative worst case scenarios for socio-economics (including tourism and recreation). The PEIR/ES will provide a detailed Project Description describing the final Rochdale envelope for the Norfolk Vanguard DCO application. Each chapter of the PEIR/ES will define the worst case scenario arising from the construction, operation and decommissioning phases of the Norfolk Vanguard project for the relevant receptors and impacts. Additionally, each chapter will consider separately the anticipated cumulative impacts of Norfolk Vanguard with other relevant projects which could have a cumulative impact on the receptors under consideration.

2.2.1 Infrastructure Parameters

26. The largest number of structures and greatest spatial extents (and dimensions) would result in the worst case scenario in relation to socio-economics, tourism and recreation. For this topic, although the term 'worst case' is utilised to be consistent with the other topics in the EIA. As socio-economic impacts considered in this chapter could be positive or negative a conservative approach will be taken presenting the lower likely positive impacts (e.g. economic and employment considerations) and the worst likely adverse impact anticipated (e.g. loss of tourist accommodation or disturbance to tourism activities).

27. Two electrical solutions are being considered for Norfolk Vanguard, a High Voltage Alternating Current (HVAC) and a High Voltage Direct Current (HVDC) scheme. The

decision as to which option will be used for the project will be agreed post consent and will depend on availability, technical considerations and cost. Both electrical solutions will have implications on the required onshore infrastructure. Typically the HVAC scenario involves a greater area of land take and additional infrastructure, and as such the HVAC scenario is assumed as the worst case in the remainder of this section. Where the worst case assumes the HVDC scenario, this is stated in the text.

28. There is an option for the cable ducts for Norfolk Boreas, (the sister project to Norfolk Vanguard) to be constructed and installed simultaneously with Norfolk Vanguard within a single cable corridor (see parameters in Section 2.2.1.3). Therefore this scenario will be considered within the Norfolk Vanguard EIA as associated development as part of the DCO application. There is also the scenario that the ducts for Norfolk Boreas cannot be installed at the same time as Norfolk Vanguard and therefore this scenario will be considered within the Cumulative Impact Assessment (CIA), together with the parameters of Norfolk Vanguard (as listed in the bullets points above).

29. All other components of Norfolk Boreas will be considered as part of the Norfolk Vanguard CIA.

30. The remainder of this section sets out the key parameters of the project worst case scenario relevant to socio-economic impact assessment. The section is subdivided into the key elements of the onshore electrical infrastructure (landfall, onshore cable corridor, cable relay station, and substation and extension to the existing Necton 400kV National Grid substation) and covers the construction, operation and maintenance (O&M) and decommissioning phases of the project.

2.2.1.1 Landfall

31. There are three potential landfall locations for Norfolk Vanguard:

- Bacton Green;
- Walcott Gap; and
- Happisburgh South.

32. Initial survey and data collection for the EIA will enable the selection of the landfall location for Norfolk Vanguard. The PEIR and ES will present a single landfall option.

33. The Norfolk Vanguard offshore cables will be jointed to the onshore cables on the landward side of the landfall site. Cable ducts would be installed at the landfall so that the ends of the offshore cables can be pulled through to this joint location. These will be installed using Horizontal Directional Drilling (HDD) which is a trenchless installation technique. The HDD will exit at one of the following two locations:

- On the beach, above the level of mean low water spring (classified as "short HDD"). The worst case scenario for tourism and recreation impacts.
- At an offshore location, away from the beach (up to 1000m in drill length) (classified as "long HDD").

34. Key parameters:

- A total of 6 ducts for the HVAC option or 2 ducts for the HVDC option would be required at the landfall for Norfolk Vanguard.
- Temporary footprint of works will be 3000m^2, of which 900m^2 (6 transition pits) will involve excavation (for Norfolk Vanguard and Norfolk Boreas to be constructed simultaneous).
- There will be no permanent above ground infrastructure at landfall.
- Noise from each HDD site is generally associated with generators at the location with a noise emission of 77 dB L_{Aeq} at 10m. At 50m distance from an average HDD site the noise level is 70dB(A) and at 100m is typically 60dB(A).
- Drilling and demobilisation will take approximately 30 weeks when considering 12 hour (7am-7pm), 7 day shifts. 24 hour lighting of the temporary footprint will be required through construction.

35. If Norfolk Boreas cable ducts are installed concurrently with the Norfolk Vanguard ducts, the Norfolk Boreas ducts will be installed up to the joint pits on the landward site of the landfall works. No landfall works (e.g. transition pits, HDD works) will be undertaken for Norfolk Boreas and therefore the landfall works for Norfolk Boreas do not form part of the Norfolk Vanguard DCO and will be considered in the CIA (see Section 2.2.6).

2.2.1.2 Cable Relay Station

36. A cable relay station is required for an HVAC electrical solution only and would not be included in a HVDC connection solution. Therefore the HVAC option is the worst case scenario for this element of the onshore infrastructure.

37. The cable relay station accommodates the reactive compensation equipment required to compensate the capacitive losses generated by long HVAC power cables, and will be located near to the landfall.

38. There are currently seven cable relay station search zones being considered and a final location will be defined following landfall site selection and will be known for the EIA and DCO application. The PEIR and ES will present a single cable relay station location.

39. Key parameters:

- There will be a maximum temporary loss of habitat of 15000m^2 during construction of the cable relay station.
- Low level lighting will be required for the duration of the construction phase.
- The operational area of the cable relay station will be approximately 10,500m^2.

2.2.1.3 Cable Corridor

40. There are several potential scenarios for the cable easement:

- Norfolk Vanguard HVDC: This would require a 35m temporary strip during construction, and a 13m permanent strip (including 8m access) during operation.
- Norfolk Vanguard HVAC: This would require a 50m temporary strip during construction, and a 25m permanent strip (including 8m access) during operation.
- Norfolk Vanguard and Norfolk Boreas HVDC: This would require a 45m temporary strip during construction, and a 20m permanent strip with (including 8m access) during operation.
- Norfolk Vanguard and Norfolk Boreas HVAC: This would require a 100m temporary strip during construction, and a 54m permanent strip (including two separate 8m access tracks and 6m separation between circuits) during operation.

41. Key parameters:

- Under the worst case scenario cable easement described above, an onshore temporary easement of 100m width corridor will be required. This will result in a temporary loss of a 100m area strip along the full length of the onshore cable corridor during the installation of the cable ducts. This will include a 38m wide strip for cable excavation (up to 12 cable trenches), two 6m wide access tracks either side of the 38m strip, and two 9m and two 13m strips for excavated material storage and topsoil storage respectively.
- The length of the onshore cable route will be approximately 60km.
- The main cable installation method will be through the use of open cut trenching with High Density Polyethylene (HDPE) ducts installed, backfilled and cables pulled though the pre-laid ducts.
- The access tracks will be formed of protective matting, temporary metal road or permeable gravel aggregate dependant on the ground conditions.
- Joint pits with a footprint of 90m^2 will be required every 800m along the cable route (i.e. approximately 75 in total) for installation of cables in the pre-installed cable ducts.

- Where trenchless techniques (i.e. HDD) are required (e.g. at water crossings), there will a temporary loss of habitat of approximately 2500m^2 and 5000m^2 to support the HDD launch and receptor sites.
- Mobilisation areas will also be required for servicing the cable installation. These will be required to store equipment and provide welfare facilities. These will involve a temporary loss of habitat of 10000m^2 for the footprint of these areas. Hardstanding will be laid for the duration of construction.

2.2.1.4 Onshore Substation

42. A single onshore substation will be required regardless of whether HVAC or HVDC options are selected and the two options will have similar land take requirements:

    - HVAC:
        - Construction area approximately 400m x 400m
        - Substation footprint (within construction area) approximately 250m x 300m
    - HVDC:
        - Construction area approximately 400m x 400m
        - Substation footprint (within construction area) approximately 250m x 300m

43. Low level lighting will be required for the duration of the construction phase.

44. A substation search zone (which has been refined from the substation search area shown in the Norfolk Vanguard EIA Scoping Report (Royal HaskoningDHV, 2016)) is located to the south and east of the existing Necton 400kV National Grid substation. Initial survey and data collection for the EIA will enable the selection of the substation location for Norfolk Vanguard. The PEIR and ES will present a single substation location.

2.2.1.5 National Grid substation extension

45. An extension to the existing Necton 400kV National Grid substation will be required regardless of whether the HVAC or HVDC electrical solution is selected.

46. The busbar would be extended in an east west direction with seven additional Air Insulation Switchgear (AIS) bays for Norfolk Vanguard.

47. The extension to the existing Necton 400kV National Grid substation for Norfolk Vanguard and Norfolk Boreas combined would require a further busbar extension and five further AIS bays for Norfolk Boreas. This extension to the Necton 400kV National Grid substation will be included in the Norfolk Vanguard DCO and EIA.

48. Re-configuration of overhead lines to change the arrangements of the 400kV circuits in close proximity to the substation would also be required.

49. The National Grid substation extension will be included within the EIA for the Norfolk Vanguard DCO application.

2.2.1.6 Offshore

50. The worst case scenarios for offshore socio-economic and tourism impacts will be associated primarily with impacts on shipping and commercial fisheries as well as relevant marine recreational activities (e.g. SCUBA diving). The offshore project area is shown in Figure 1.1 of the Norfolk Vanguard EIA Scoping Report (Royal HaskoningDHV, 2016). At the time of writing the worst case scenarios for the offshore impact assessments are being developed and therefore this method statement focuses on onshore impacts.

2.2.2 Construction Programme

51. The HVAC option is based on a three phase development programme which would take a total of seven years (2020-2026), while the HVDC option is based on a two phase development programme which would take a total of six years (2020-2025). Both programmes include two years of enabling works between 2020 and 2021, consisting of road modifications, hedge and tree removal, preconstruction drainage, mobilisation area establishment and major crossing construction.

52. Duct installation for the landfall and onshore cable and primary works for the substation and cable relay station would take place during 2022 and 2023. The installation of the onshore cables would occur in phases in parallel with the commissioning of the phases of the offshore wind farm. In the HVAC programme, the cable and electrical plant installation and commissioning will take place over three years from 2024 to 2026. In the HVDC programme, installation and commissioning will take place over 2 years, from 2024 to 2025.

53. Construction works will not take place continuously in all locations during the proposed construction time. Construction activity along the onshore cable route will move along the route, between different sections and activity will be phased, with the trenching and laying of ducts taking place first, followed by the cable installation.

54. The construction period for the cable relay station and substation is expected to be approximately 18 months.

55. The greater the duration of construction and a greater level (number and density) of construction activities during the holiday periods, particularly summertime, would result in a worst case scenario for sensitive receptors. However it is also likely that

the greater duration of works is likely to maximise the positive socio-economic impact of the development in terms of job creation.

2.2.3 Operation and Maintenance (O&M) Strategy

56. There is no ongoing requirement to maintain the onshore cables following installation. However, periodic access to installed link boxes / test pits may be required for inspection, estimated to be annually.

57. It is not anticipated for the cable relay station or substation to be illuminated under normal operating conditions. Site lighting will be provided during operations and maintenance activities only, which are anticipated to occur on average once per week during operation. Peak unmitigated noise levels will be approximately 95 dB Sound Pressure Level (SPL) at 0.3.

2.2.4 Decommissioning

58. No decision has been made regarding the final decommissioning policy for the substation and cable relay station, as it is recognised that industry best practice, rules and legislation change over time. However, the substation and cable relay station equipment will likely be removed and reused or recycled. It is expected that the onshore cables will be removed from ducts and recycled, with the transition pits and ducts left in situ. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided.

2.2.5 Cumulative Impact Scenarios

59. If Norfolk Boreas uses the same landfall as Norfolk Vanguard, a total of 12 ducts would be required at the landfall (under the worst case HVAC electrical solution). The Happisburgh South landfall site is the only landfall option which can accommodate 12 ducts.

60. The following landfall scenarios for Norfolk Vanguard and Norfolk Boreas are currently being considered:

- HVDC - Landfalls for Norfolk Vanguard and Norfolk Boreas at Bacton Green (4 ducts in total)
- HVDC - Landfalls for Norfolk Vanguard and Norfolk Boreas at Walcott Gap (4 ducts in total)
- HVDC - Landfalls for Norfolk Vanguard and Norfolk Boreas at Happisburgh South (4 ducts in total)
- HVAC North - Landfall for Norfolk Vanguard at Bacton Green (6 ducts) with Norfolk Boreas at Walcott Gap (additional 6 ducts); or

- HVAC South - Landfall for Norfolk Vanguard and Norfolk Boreas at Happisburgh South (12 ducts)

61. As discussed in Section 2.2.1, initial data collection for the Norfolk Vanguard EIA will enable selection of the landfall location for Norfolk Vanguard which will also inform the site selection for Norfolk Boreas. Final landfall locations for Norfolk Vanguard and Norfolk Boreas will be confirmed in the Norfolk Vanguard CIA. The options of HVAC and HVDC will be retained in the Norfolk Vanguard DCO application. Due to the greater number of ducts, an HVAC option will represent the worst case scenario.

62. The Norfolk Boreas cable relay station (only required under the HVAC scenario) will be located within one of the cable relay station search zones shown for Norfolk Vanguard. The Norfolk Vanguard and Norfolk Boreas cable relay stations may be co-located or at separate locations, subject to the landfall site selection. Final cable relay station site locations will be known for the Norfolk Vanguard CIA. The cable relay stations for Norfolk Vanguard and Norfolk Boreas will be constructed separately, although construction periods could overlap. The footprint of the Norfolk Boreas cable relay station will be the same as described for Norfolk Vanguard in Section 2.2.1.

63. The socioeconomic CIA for Norfolk Boreas cable installation includes the following scenarios:

- Ducts for Norfolk Boreas are pre-installed during Norfolk Vanguard construction with cable pull through required during Norfolk Boreas construction;
  - Norfolk Boreas duct installation will be assessed in the project impact assessments for Norfolk Vanguard;
  - The cable pull through for Norfolk Boreas will be considered as part of the Norfolk Vanguard CIA); or
- Norfolk Boreas ducts and cables are installed at a separate time to Norfolk Vanguard.
  - This scenario will also be considered in the CIA, together with the parameters of Norfolk Vanguard alone.

64. The Norfolk Boreas substation will be located in the substation search zone shown for Norfolk Vanguard but will be constructed separately, although Norfolk Vanguard and Norfolk Boreas construction periods could overlap. The footprint of the Norfolk Boreas substation will be the same as those described for Norfolk Vanguard (Section 2.2.1).

65. As discussed in Section 2.2.1, the extension to the existing Necton 400kV National Grid substation for Norfolk Boreas would be done concurrently with Norfolk Vanguard construction under the Norfolk Vanguard DCO and therefore this is considered as part of the Norfolk Vanguard EIA.

2.2.5.1 Other Projects

66. Construction and commissioning of the substation for the Dudgeon Offshore Wind Farm is complete and operation is due to commence in 2017. The cumulative socioeconomic impacts are therefore likely to be small, however, a cumulative impact relating the setting and potential noise outputs from the substations will be considered further in the CIA.

67. The cable corridor for the Hornsea Project 3 Offshore Wind Farm makes landfall at Weybourne with grid connection at Norwich Main. Where the Hornsea Project 3 cable corridor crosses the Norfolk Vanguard cable corridor, there will be potential socio-economic impacts if Hornsea Project 3 is constructed concurrently, these will be identified and assessed in the CIA.

68. Other developments (such as housing and roads) will be considered in the CIA. CIA screening will be undertaken in consultation with stakeholders.

3 BASELINE ENVIRONMENT

3.1 Desk Based Review

3.1.1 Available Data

69. The Norfolk Vanguard EIA Scoping Report (Royal HaskoningDHV, 2016) provides baseline information on Socio-economics and Tourism. The study area for the impact assessment remains the Norfolk region for the onshore infrastructure as well as the waters in and around the offshore project area.

70. Data sources that will be reviewed during the EIA include:

- The Office for National Statistics (ONS) data on regional and local labour market and trends (including education levels), local and regional population and trends, local and regional employment and trends, and local and regional health statistics.
- Local letting agents and tourist information for quantities of temporary and rented accommodation supply and trends. This will include a detailed search of the available tourist accommodation in the work area, and an informal 'questionnaire' survey of accommodation owners/managers regarding accommodation provision, including seasonality.
- New Anglia Local Enterprise Partnership (LEP) data on the local economy, including growth areas and constraints / focus of funding (e.g. employment workforce training / upskilling).
- Norfolk County Council, Great Yarmouth Council, and Breckland District Council data on workforce, developments, and strategic planning in relation to socio-economic receptors.
- OS maps combined with ONS data (based on ONS census data grouped by 'lower level super output areas'). This data will be used to identify detailed community and population data in the substation locations.
- Visit Norfolk, Sport England, and numerous tourist information sites will be searched to locate any recreational and tourist sites. This will include the Council Rights of Way Department (separate to, or within, their Highways Department) where use numbers for PRoW will also be requested as well as a copy of the definite footpath map.

3.2 Planned Data Collection

71. As noted above, a detailed search of the available tourist accommodation in the work area will be undertaken, and an informal 'questionnaire' survey completed with any accommodation owners/managers regarding their accommodation provision, including seasonality.

4 IMPACT ASSESSMENT METHODOLOGY

4.1 Defining Impact Significance

72. There is no defined or recommended procedure or guidance for assessing the significance of impacts on or to socio-economic receptors. The methodology would therefore adopt the standard source-pathway-receptor model approach, and utilise the generic criteria for determining impact significance as described below.

4.1.1 Sensitivity

73. Each receptor will be considered in light of its potential sensitivity to the effect resulting from the relevant source-element by which it is likely to be influenced. Table 4.1 presents generic definitions which will be used, supported by technical expertise and professional knowledge to ascertain (and justify) the sensitivity.

Table 4.1 Example definitions of the different sensibility levels for a generic receptor (please define sensitivities appropriate to your topic)

Sensitivity	Definition
High	Receptor has very limited tolerance of effect
Medium	Receptor has limited tolerance of effect
Low	Receptor has some tolerance of effect.
Negligible	Receptor generally tolerant of effect.

4.1.2 Value

74. In addition, for some assessments the 'value' of a receptor may also be considered – for instance if a receptor is designated or has an economic value.

Table 4.2 Example definitions of the value levels for a generic receptor (please define values appropriate to your topic)

Value	Definition
High	Nationally important / scarce with limited potential for offsetting / compensation.
Medium	Regionally important / scarce with limited potential for offsetting / compensation.
Low	Locally important / scarce
Negligible	Not considered to be particularly important / scarce

75. It should be noted that high value and high sensitivity are not necessarily linked within a particular impact. A receptor could be of high value (e.g. a protected area or visitor facility) but have a low or negligible sensitivity to an effect (e.g. by virtue of distance or lack of visibility) – it is important not to inflate impact significance just

because a feature is 'valued'. This is where the expert judgement of the assessor is critical and highlights the importance of ensuring a clear narrative behind the assessment.

4.1.3 Magnitude

76. The magnitude of each effect on a socio-economic receptor (or class or group of receptors) will be determined and classified using the generic description presented in Table 4.3, on the basis of expert judgement. Justification will be provided.

Table 4.3 Example definitions of the magnitude levels for a generic receptor

Magnitude	Definition
High	Fundamental, permanent / irreversible changes, over the whole receptor, and / or fundamental alteration to key characteristics or features of the particular receptors character or distinctiveness.
Medium	Considerable, permanent / irreversible changes, over the majority of the receptor, and / or discernible alteration to key characteristics or features of the particular receptors character or distinctiveness.
Low	Discernible, temporary (throughout project duration) change, over a minority of the receptor, and / or limited but discernible alteration to key characteristics or features of the particular receptors character or distinctiveness.
Negligible	Discernible, temporary (for part of the project duration) change, or barely discernible change for any length of time, over a small area of the receptor, and/or slight alteration to key characteristics or features of the particular receptors character or distinctiveness.

4.1.4 Significance

77. Following the identification of receptor value and the sensitivity and magnitude of the effect, it is possible to determine the significance of the impact. A matrix as presented in Table 4.4 will be used where relevant. It is important that the matrix (and indeed the definitions of sensitivity and magnitude) is seen as a framework to aid understanding of how a judgement has been reached from the narrative of each impact assessment and it is not a prescriptive formulaic method.

78. Criteria, including sources and justifications, for quantifying the different levels of impact will be provided. Where possible, this is based upon quantitative and accepted criteria together with the use of value judgement and expert interpretation to establish to what extent an impact is significant.

Table 4.4 Impact Significance Matrix

		Negative Magnitude				Beneficial Magnitude			
		High	Medium	Low	Negligible	Negligible	Low	Medium	High
Sensitivity	High	*Major*	*Major*	*Moderate*	*Minor*	*Minor*	*Moderate*	*Major*	*Major*
	Medium	*Major*	*Moderate*	*Minor*	*Minor*	*Minor*	*Minor*	*Moderate*	*Major*
	Low	*Moderate*	*Minor*	*Minor*	*Negligible*	*Negligible*	*Minor*	*Minor*	*Moderate*
	Negligible	*Minor*	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Minor*

79. Table 4.5 presents a definition of the impact significance identified through the matrix approach.

Table 4.5 Impact Significance Definitions

Impact Significance	Definition
Major adverse	Very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or, could result in exceedance of statutory objectives and/or breaches of legislation.
Moderate adverse	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor adverse	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision making process.
Negligible	No discernible change in receptor condition.
Minor beneficial	The impact is of minor significance, but has been assessed as having some environmental benefit.
Moderate beneficial	The impact is assessed as providing a moderate gain to the environment.
Major beneficial	The impact is assessed as providing a significant positive gain to the environment.

80. Note that for the purposes of the EIA, major and moderate impacts are usually deemed to be significant. In addition, whilst minor impacts are not significant in their own right, it is important to distinguish these from other non-significant impacts as they may contribute to significant impacts cumulatively or through interactions.

81. Embedded mitigation will be referred to and included in the initial assessment of impact. If the impact does not require mitigation (or none is possible) the residual impact will remain the same. If however, mitigation is required there will be an assessment of the post-mitigation residual impact.

4.2 Potential Impacts

82. The following impacts have been recommended for assessment within the Scoping Opinion (or as specific requests by consultees):

- Direct and supply chain job creation and available workforce in the area (both during construction and operation).
- Impact on community infrastructure, local businesses, and residents (including home workers) particularly of the substation sites. Impact on Bathing Water / Blue Flag beaches and resulting effect on tourism and recreation.
- Impacts of workforce accommodation on tourism in the short, medium and long term.
- Obstruction or disturbance to PRoW and other long distance routes.
- Impact on other recreation / tourism assets (such as Bacton Wood).

4.2.1 Potential Impacts during Construction

4.2.1.1 Impact: Direct and Supply Chain Job Creation

83. The construction of the onshore and offshore elements of Norfolk Vanguard will result in increased (or continued) employment in a range of sectors and at a range of skill levels. This will arise from the construction and commissioning of the offshore elements of the project, in particular the cable relay station and substation construction and commissioning. There will also be a concentration of supply chain activity and opportunity associated with the loadout port from its creation and during the significant offshore construction phase.

4.2.1.2 Approach to assessment

84. The assessment will, as far as possible, quantify the level of resident and non-resident employment and assess the significance of this positive socioeconomic impact at the local, regional and national level. Significance will be apportioned in relation to the current unemployment levels at the local, regional and national levels. Increased employment will be temporary or permanent on the basis of the likely contractors to be used.

4.2.1.3 Impact: Effects on Community Infrastructure

85. There is a perception that substations and their presence could impact on community infrastructure, recreational and tourism infrastructure, local businesses, and residents (including home workers).

4.2.1.4 Approach to assessment

86. The final locations of the substation, cable relay station and construction areas and their surroundings will be reviewed in terms of spatial presence of community, tourism and recreational infrastructure (for example, local commons, PRoW, camping sites, woodland) in order to determine the presence / absence of any receptors. In addition, a buffer zone of potential disturbance will be derived from the assessments carried out for transport, noise, air, and landscape. The buffer zone will determine the area and receptors to be considered in terms of economic displacement or disruption that could arise during construction, either from obstruction, loss, from increased activity as a result of workforce use. Quantification of the scale of effects would be undertaken on the basis of sensitivity and anticipated levels of existing economic/social value of the receptors that could be affected. The significance will be determined on the basis of magnitude, duration and frequency of the activity or disturbance.

4.2.1.5 Impact: Deterioration to Bathing Water / Blue Flag beaches and resulting effect on Tourism and Recreation

87. The landfall and associated nearshore cable construction works could result in deterioration to the Bathing Water / Blue Flag beach status. Such a deterioration, could discourage visits by residents and non-residents and result in local economic decline.

4.2.1.6 Approach to assessment

88. The potential water quality impacts during construction on designated bathing beaches will be assessed in the Marine Water Quality assessment. Using the outcome the potential for discouragement of users will be undertaken. This will incorporate any monitoring undertaken for other nearshore projects and ad hoc and anecdotal responses from stakeholder and community consultation undertaken as part of the EIA and DCO application process.

89. Economic guidance (HM Treasury, 1997; Penning-Rowsell *et al*, 1992) states that if visitors are disuaded from one location it should be assumed they would visit an alternative. Any economic losses other than increased travel costs would be a loss to the local economy and not the nation (or region). Overall, an estimation of potential scale of impact on visitor numbers will be undertaken using previous studies, surveys, guidance and anecdotal findings.

4.2.1.7 Impact: Reduction in Available Accommodation due to Construction Personnel

90. The presence of a workforce during construction which is non-resident will result in a need for accommodation during some or the entire duration of the construction

phase. Whilst there is a positive economic impact for accommodation providers in having high levels of occupancy there is also a potential negative impact on a reduction of available accommodation to serve the tourist industry. Reducing the available provision for tourist accommodation may result in temporary as well as potentially longer term impacts.

4.2.1.8 Approach to assessment

91. Following determination of the level of accommodation available during baseline information gathering, an estimation of the workforce numbers requiring accommodation and the duration of this will be undertaken as the project design is further developed. This assessment will be made on the basis of a travel to work extent that will be discussed and agreed with our transport specialists, and agreed with stakeholders. The level of accommodation need will then be assessed against the current baseline availability. Any overlap will be assessed and mitigation measures discussed and agreed where relevant.

4.2.1.9 Impact: Obstruction or Disturbance to Users of PRoW and Other Rights of Way

92. The construction works at various onshore locations could result in obstruction or disturbance (noise, air, visual) to Public Rights of Way and the users of them. As with the above impact on Bathing Waters this could result in temporary or worse reductions in visitor numbers. Experience has shown that construction activities can become a draw for members of the public, eliciting curiosity in the activities being carried out particularly if they are short-term in nature.

4.2.1.10 Approach to assessment

93. Obstruction to Public Rights of Way will be assessed for specific affected locations. There will be a presumption to provide a temporary diversion for such obstructions during construction. As such, the likely increased distance to the Public Right of Way will be assessed as well as an estimate of whether this will dissuade users and to what extent.

94. The potential disturbance impacts on Rights of Way will be quantified and assessed in the other chapters such as Noise, Air Quality, and Landscape and Visual. Using the outcome, the potential for discouragement of users will be reviewed, including any ad hoc and anecdotal responses arising from the consultation 1 being undertaken with stakeholders and communities. Overall, an estimation of the potential scale and duration of impact will be undertaken using previous studies, surveys, guidance and anecdotal findings, and the significance assessed.

4.2.1.11 Impact: Obstruction or Disturbance to Other Recreation / Tourism Assets

95. The construction works at various onshore locations could result in obstruction or disturbance (noise, air, visual) to recreation / tourism assets (sites). As with the above impact on Public Rights of Way this could result in temporary or worse reductions in visitor numbers.

4.2.1.12 Approach to assessment

96. Obstruction to recreation / tourism assets will be assessed on the basis of where obstruction or loss (from working area) takes place. The significance of the impact will be assessed on the basis of the asset affected (and its value).

97. The potential disturbance impacts on recreation / tourism assets will be quantified and assessed in the other chapters such as Noise, Air Quality, and Landscape and Visual. Using the outcome, the potential for discouragement of users will be reviewed, including views arising from the consultation being undertaken with stakeholders and communities. Overall, an estimation of the potential scale and duration of impact will be undertaken using previous studies, surveys, guidance and anecdotal findings, and the significance assessed.

4.2.2 Potential Impacts during O&M

4.2.2.1 Impact: Job Creation

98. The O&M phase of the onshore and offshore elements will result in some increase (or continued) employment in a range of sectors and at a range of skill levels to support the operation of Norfolk Vanguard. The creation of an offshore O&M base to assist in servicing the offshore wind farm is likely to result in the creation of new facilities and to create a number of long term employment opportunities. The substation will also require an ongoing programme of monitoring and maintenance.

4.2.2.2 Impact: Effects on Community Infrastructure

99. There is a perception that the presence of the substation and cable relay station could impact on community infrastructure, recreational and tourism infrastructure, local businesses, and residents (including home workers) during the lifetime of the wind farm.

4.2.2.3 Impact: Reduction in Available Accommodation due to O&M Personnel

100. The presence of the O&M workforce during annual maintenance season who are non-resident will result in a need for accommodation throughout the operational lifetime. Accommodation providers may prioritise such accommodation provision

over tourist visitors, thus reducing the available provision and resulting in a potential long term impact.

4.2.2.4 Impact: Obstruction or Disturbance to Other Recreation / Tourism Assets

101. The operational and maintenance phase works at various onshore locations could result in localised obstruction or disturbance (noise, air, visual) to recreation / tourism assets (sites). As with the above impact on Rights of Way this could result in potential long-term reductions in visitor numbers.

4.2.3 Potential Impacts during Decommissioning

102. No decision has been made regarding the final decommissioning plans for the substation, as it is recognised that industry best practice, rules and legislation change over time.

103. A full EIA will be carried out ahead of any decommissioning works being undertaken. The programme for decommissioning is expected to be similar in duration to the construction phase of 18 months

4.2.4 Potential Cumulative Impacts

4.2.4.1 Impact: Direct and Supply Chain Job Creation

104. The construction of various other offshore wind farms, notably Norfolk Boreas and Hornsea Project 3 along with other projects in the former East Anglia Zone over the projected construction phase (e.g. 2020 to 2026) has the potential to result in significant non-resident employment opportunities but also some resident employment opportunities in a range of sectors and at a range of skill levels.

4.2.4.2 Approach to assessment

105. The assessment methodology will utilise data on the other projects, their spatial locations and workforce numbers available in the relevant Environmental Statements. A programme will be developed to show the likely combined numbers and activities across the construction, operation, and decommissioning lifetime of each relevant project.

4.2.4.3 Impact: Effects on Community Infrastructure

106. There is a perception that substations and their construction and presence could impact on community infrastructure, recreational and tourism infrastructure, local businesses, and residents (including home workers).

4.2.4.4 Approach to assessment

107. The assessment will utilise data on the other projects including the spatial locations of substations and relevant permanent features, as well as the intermittent and temporary activities. The assessment will be supported by a spatial distribution map created to identify the areas and receptors likely to be cumulatively affected.

4.2.4.5 Impact: Reduction in Available Accommodation due to Construction Personnel

108. The presence of a non-resident workforce throughout the lifetime of the project and of the other wind farm and related large scale projects could result in a reduction in the provision of accommodation for visitors over the long-term.

4.2.4.6 Approach to assessment

109. The assessment methodology will use spatial locations and (non-resident) workforce numbers for other projects, available in the relevant Environmental Statements. A programme will be developed to show the likely combined numbers and activities across the construction, operation, and decommissioning lifetime of the project. The impact will then be assessed across the whole lifetime cumulatively.

4.2.4.7 Impact: Obstruction or Disturbance to Other Recreation / Tourism Assets

110. The construction and operation of a number of large scale wind farm and other relevant projects could result in obstruction or disturbance (noise, air and visual) to recreation / tourism assets (sites).

4.2.4.8 Approach to assessment

111. The assessment methodology will be the same as that described for construction, utilising data on the other projects including the spatial locations of the activities, and considering them in terms of the lifetime of the project.

5 REFERENCES

Breckland Council (2015) Breckland Local Plan Preferred Directions Part 1 Consultation Version.

Great Yarmouth Borough Council (2015) The Plan 2015-2020. Available at: http://www.great-yarmouth.gov.uk/CHttpHandler.ashx?id=1419&p=0 [Accessed September 2016]

HM Treasury (1997) "The Green Book" Appraisal and Evaluation in Central Government.

Miller Reserch Consulting (2016 unpublished). Norfolk Vanguard Offshore Wind Farm: Socio-Economic Study.

New Anglia LEP (2014) New Anglia Strategic Economic Plan

Norfolk County Council (2012) Norfolk Insight, Demographic Overview. Available at: http://www.norfolkinsight.org.uk/population.asp [Accessed at: 09/08/16]

Norfolk County Council (2012b) Economic Assessment for Norfolk.

Norfolk County Council (2016b) Public Rights of Way.

Office for National Statistics (2015) English Indices of Deprivation. Available at: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015 [Accessed July 2016] Provided in Miller Research Consulting, 2016.

Office for National Statistics (2015b) Annual Population Survey. Provided in Miller Research Consulting, 2016.

Office for National Statistics (2015c) UK Business Counts. Available at: http://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/bulletins/ukbusinessactivitysizeandlocation/2015-10-06 [Accessed July 2016] Provided in Miller Research Consulting, 2016.

Office for National Statistics (2016) UK Labour Market: April 2016. Available at: http://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/uklabourmarket/april2016 [Accessed July 2016] Provided in Miller Research Consulting, 2016.

PD Ports (2014) Offshore Wind Project Cost Outlook. Available at: http://www.cleanenergypipeline.com/Resources/CE/ResearchReports/Offshore%20Wind%20Project%20Cost%20Outlook.pdf

Penning-Rowsell, E. C., Green, C. H., Thompson, P. M., Coker, A. M., Tunstall, S. M., Richards, C., Parker, D. J. (1992) The Economics of Coastal Management – A Manual of Benefit Assessment Techniques.

Public & Corporate Economic Consultants (PACEC) & Breckland Council, 2015) Breckland Economic Prosperity Strategy. Available at: http://www.pacec.co.uk/wp-content/uploads/2015/09/Breckland_Strategic_Partnership_-_Breckland_Economic_Prosperity_Strategy.pdf [Access September 2016]

Royal HaskoningDHV (2016). Norfolk Vanguard Offshore Wind Farm Environmental Impact Assessment Scoping Report

Royal HaskoningDHV (2017) Norfolk Vanguard Offshore Wind Farm: Evidence Plan Terms of Reference. Document Reference PB4476.001.004. Unpublished – Live Document

Shields, M (2016) Norfolk Limited: Profits fall and economy stalls – but companies show resilience,

says report. Eastern Daily Press, 21 June 2016. Available at: http://www.edp24.co.uk/business/norfolk_limited_profits_fall_and_economy_stalls_but_companies_show_resilience_says_report_1_4586062 [Accessed: July 2016] Provided in Miller Research Consulting, 2016.