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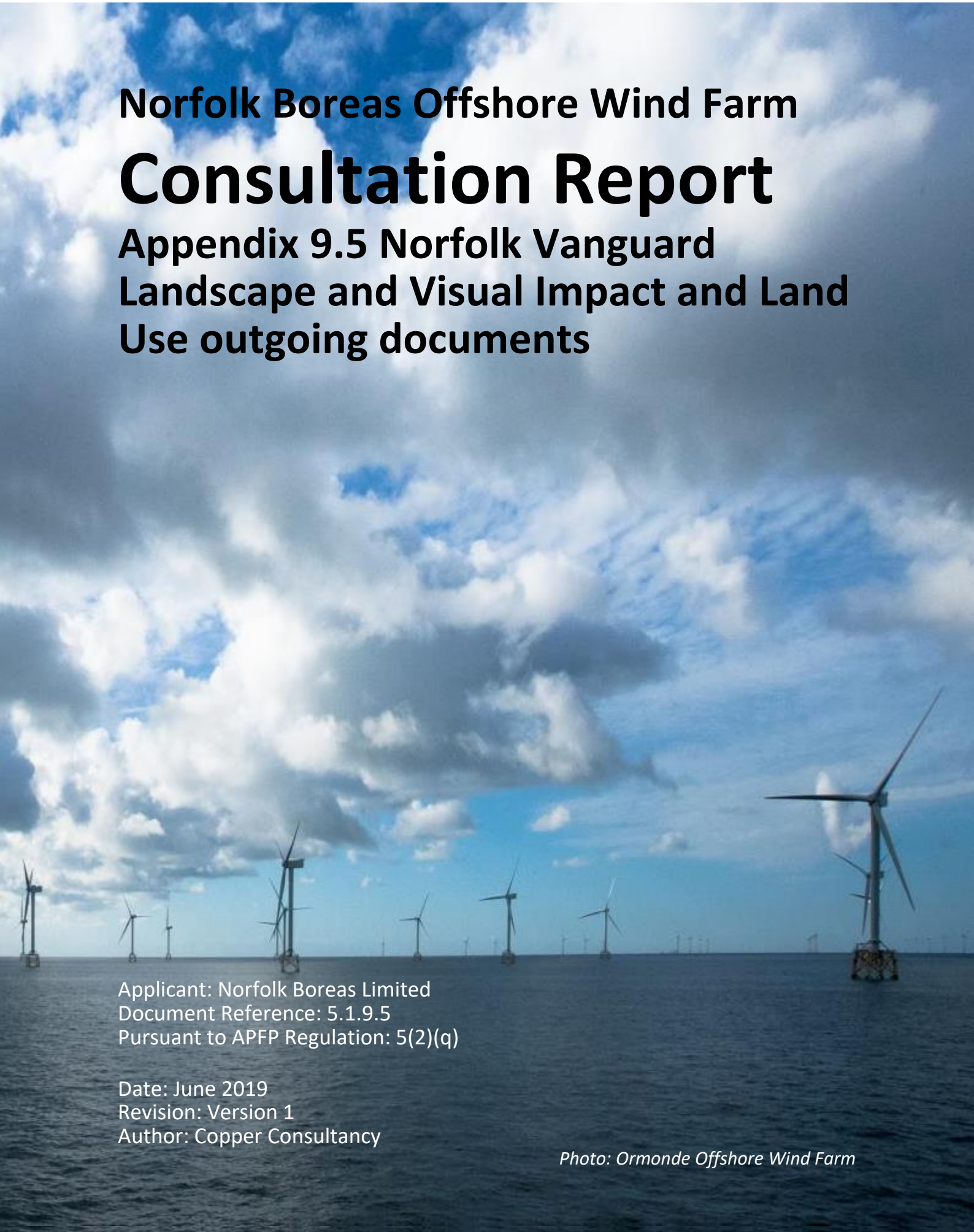
Norfolk Boreas Offshore Wind Farm

Consultation Report

Appendix 9.5 Norfolk Vanguard Landscape and Visual Impact and Land Use outgoing documents



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Norfolk Vanguard Offshore Wind Farm

Environmental Impact Assessment

Onshore Land Use Method Statement

Document Reference: PB4476-003-030

Author: Royal HaskoningDHV
Date: 13th January 2017
Client: Vattenfall Wind Power Ltd

Date	Issue No.	Remarks / Reason for Issue	Author	Checked	Approved
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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.

Table of Contents

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 onshore land use effects of the proposed development.

2. This land use 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

5. This section provides an overview of key milestone dates for Norfolk Vanguard.

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

6. The Evidence Plan Terms of Reference (Royal HaskoningDHV, 2017) 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 updates to the ES following PEI consultation

1.2.3 Survey Programme

7. The land use assessment will be undertaken by desk based assessment and no surveys are currently proposed.

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 land use. 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. 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.

27. The following key onshore project parameters are considered:

- Landfall;

- Cable relay station if required (HVAC only) within the cable relay station search zones;
- Cable corridor (with associated construction compounds and mobilisation areas);
- Onshore substation (within the substation search zone); and
- Extension to the existing Necton 400kV National Grid Substation, including overhead line modification.

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.

2.2.1.1 Landfall

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

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

31. Initial survey and data collection for the EIA will enable the selection of the landfall location for Norfolk Vanguard. Therefore the approach to baseline characterisation will initially consider all options and will then be refined once a final landfall location is selected. The PEIR and ES will present a single landfall option.

32. 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”). This presents the worst case scenario for land use.

- At an offshore location, away from the beach (up to 1000m in drill length) (classified as “long HDD”).

33. 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. Therefore the HVAC option represents the worst case scenario for land use.
- Temporary footprint of works will be up to 3000m^2, of which up to 900m^2 (6 transition pits, based on the HVAC option) will involve excavation for Norfolk Vanguard.
- There will be no permanent above ground infrastructure at landfall.

34. 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 2.2.5).

2.2.1.2 Cable Relay Station

35. A cable relay station is required for a 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.

36. 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.

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

38. Key parameters:

- There will be a maximum temporary footprint of 15000m^2 during construction of the cable relay station.
- The operational area of the cable relay station will be approximately 10,500m^2.

2.2.1.3 Cable Route

39. 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. This will be the worst case scenario for land use.

40. Key parameters:

- The length of the 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.
- 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 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 footprint 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 require a temporary footprint of 10000m^2. Hardstanding will be laid for the duration of construction.

2.2.1.4 Onshore Substation

41. 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 400m x 400m
  - Substation footprint 250m x 300m
- HVDC:
  - Construction area approximately 400m x 400m
  - Substation footprint (within construction area) approximately 250m x 300m

42. 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, and feedback from the local community and stakeholders, will enable the selection of the substation location for Norfolk Vanguard. Therefore the approach to baseline characterisation will initially consider the search zone and will then be refined once a final substation location is selected. The PEIR and ES will present a single substation location.

2.2.1.5 National Grid substation extension

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

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

45. The extension to the existing Necton 400kV National Grid substation for Norfolk Vanguard and Norfolk Boreas combined would require a further busbar extension with 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.

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

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

2.2.2 Construction Programme

48. 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 during 2020 and 2021, consisting of road modifications, hedge and tree removal, pre-construction drainage, mobilisation area establishment and major crossing construction.

49. 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.

50. Construction works will not take pace 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.

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

2.2.3 Operation and Maintenance (O&M) Strategy

52. 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.

53. Operations and maintenance activities associated with the substation and cable relay station are anticipated to occur on average once per week.

2.2.4 Decommissioning

54. 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 joint 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

2.2.5.1 Norfolk Boreas

55. 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.

56. 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)

57. 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.

58. 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.

59. The 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.

60. 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).

61. 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.

2.2.5.2 Other Projects

62. Construction and commissioning of the substation for the Dudgeon Offshore Wind Farm is complete and operation is due to commence in 2017. The cumulative impacts on land use are therefore likely to be minimal, however this will be considered further in the CIA.

63. The cable corridor for the Hornsea Project 3 Offshore Wind Farm makes landfall at Weybourne and grid connection at Norwich Main. There will be potential cumulative impacts on land use where the Hornsea Project 3 cable corridor crosses the Norfolk Vanguard cable corridor and in the context of the wider region.

64. Other developments (such as housing and roads) will be considered in the CIA. Consultation with stakeholders will assist in developing a list of projects to be considered in the CIA.

3 BASELINE ENVIRONMENT

3.1 Desk Based Review

65. A desk based review of onshore land use receptors was undertaken as part of the scoping report. The Environmental Statement will build upon this information to thoroughly characterise the baseline environment and identify the receptors that could potentially be impacted by the proposed development.

66. An initial update to the desk based review presented in the scoping report is provided in the subsequent sections. This takes into account the revised cable corridor.

3.1.1 Available Data

67. The data sources to be used to inform the land use baseline review will include:

- Ordnance Survey (2016) 'A' Roads, Railway Lines and Urban Areas;
- Natural England (2016) Coastal Paths;
- Natural England (2015) Agriculture Land Classifications;
- Royal HaskoningDHV (2016b) Sheringham Shoal and Dudgeon Underground Cables (derived from publically available resources);
- Norfolk County Council (2016) Public Rights of Way (PRoW);
- Sustrans (2015) Regional and National Cycle Routes; and
- National Grid (2015) High Pressure Gas Pipelines.

68. The assessment to be undertaken as part of the EIA will use the Natural England 898.Agricultural Land Classification (ALC) system. This system grades agricultural land from Grade 1 (best quality) through to Grade 5 (poorest quality) based on factors including climate, nature of the soil and site-based factors.

3.1.2 Landfall and onshore cable relay station

69. There are 3 potential locations for the landfall: Bacton Green, Walcott Gap and Happisburgh South, and 7 potential locations for the onshore cable relay station.

70. The potential landfall locations comprise ALC Grade 1 (excellent quality) agricultural land, with the surrounding areas comprising mainly ALC Grade 2 (very good) agricultural land.

71. The Norfolk Coast Path and a number of other footpaths cross the potential landfall locations, and a regional cycle route and a buried, high pressure gas pipe pass close to the Bacton Green location.

72. The onshore cable relay station search zones are located within land classed as ALC Grade 1 (excellent quality) agricultural land and ALC Grade 2 (very good) agricultural land. A number of footpaths and buried, high pressure gas pipes pass near the locations, as well as a regional cycle route.

73. There are no large settlements within any of the potential locations for the landfall or onshore relay substation; however there are several villages including Happisburgh, Bacton and Walcott close by. There are no A-roads in the surrounding area, but several local roads as well as the B1159.

3.1.3 Onshore cable corridor area

74. The onshore cable corridor from landfall to the onshore grid connection at the existing Necton 400kV National Grid Substation is approximately 60km long and passes through a number of different grades of agricultural land, primarily ALC Grade 2 at Banningham, Aylsham and Southgate and ALC Grade 3 in the areas between. There is a small area of ALC Grade 4 (moderate to poor quality) agricultural land at Mill Street, which is the proposed location of an HDD area.

75. Although the cable route avoids major urban areas, there are a number of built up urban areas in close proximity to the cable route (North Walsham, Aylsham, Reepham and Dereham). There are also several large waterbodies (River Wensum near Mill Street and River Bure crossing the cable route north of Aylsham) and an army barracks north of Woodgate.

76. The A47, A1067, A140 and A149 all cross the proposed onshore cable corridor and there are a number of PRoWs as well as National Cycle Routes 1 and 13, and Regional Cycle Route 33 crossing the proposed cable route at various points.

77. The Sheringham Shoal (from Saxthorpe to Cawston) Offshore Wind Farm underground cables run through the onshore cable route close to halfway along it.

78. There are a number of jointing pits proposed along the onshore cable route at roughly equal intervals. All are located away from major urban areas with the exception of the pit closest to the landfall, which is just north of North Walsham.

3.1.4 Onshore substation

79. The substation search zone is comprised of ALC Grade 3 (good to moderate quality) agricultural land.

80. The A47 runs adjacent to the north-west part of the substation search zone and a number of minor roads run along the southern and eastern boundaries.

81. There are no large urban areas around the grid connection location at the existing Necton 400kV National Grid Substation, with the closest being Dereham over 10km away. There are several villages and settlements including Necton, Little Dunham and Little Fransham, close to but outside the substation zone.

82. The Dudgeon Offshore Wind Farm underground cable route comes into the substation search zone from the north.

3.2 Planned Data Collection

83. The results of the initial desk based review presented above will be used as a basis for a more detailed desk based assessment to characterise the baseline for onshore land use receptors.

4 IMPACT ASSESSMENT METHODOLOGY

4.1 Defining Impact Significance

4.1.1 Sensitivity

84. The sensitivity of receptors is assessed according to the criteria set out in **Table** 4.1 below and is based on the capacity of receptors to tolerant change and whether or not increased risks would be acceptable within the scope of the prevailing legislation and guidelines. The degree of change that is considered to be acceptable is dependent on the value of a receptor, which is discussed in **Section 4.1.2** and the susceptibility of the receptor to the change that Norfolk Vanguard would have on the land use**.**

Table 4.1 Sensitivity criteria for land use receptors

Sensitivity	Definition
High	Receptor has no or very limited capacity to accommodate changes to the land use such as loss of land areas, soil degradation etc. Increased risk of reduction of land quality will be unacceptable.
Medium	Receptor has limited capacity to accommodate changes to the land use such as loss of land areas, soil degradation etc. Increased risk of reduction of land quality may be acceptable.
Low	Receptor has moderate capacity to accommodate changes to the land use such as loss of land areas, soil degradation etc. Increased risk of reduction of land quality likely to be acceptable.
Negligible	Receptor generally tolerant of changes to the land use such as loss of land areas, soil degradation etc. Insensitive to reduction in land quality.

4.1.2 Value

85. In this assessment, the value of a receptor is determined by its importance within the area, for example ALC Grade 1 agricultural land. Definitions for the value of land use receptors are provided in **Table 4.2**.

Table 4.2 Criteria for appraisal of value for land use receptors

Value	Definition
High	Receptor is a nationally important resource with limited potential for offsetting / compensation. Eg ALC Grade 1 agricultural land/major motorway.
Medium	Receptor is a regionally important resource with limited potential for offsetting / compensation. Eg regional cycle routes
Low	Receptor is locally important. Eg local road or cycle route
Negligible	Receptor is not considered to be an important resource. Eg ALC Grade 5 agricultural land.

86. 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. ALC Grade 1 agricultural land) but have a low or negligible sensitivity to an effect – it is important not to inflate impact significance just because a feature is 'valued'. This is where the narrative behind the assessment is important; the value can be used where relevant as **a modifier** for the sensitivity assigned to the receptor.

4.1.3 Magnitude

87. Potential impacts may be adverse, beneficial or neutral. Impact magnitude on a receptor has been defined with consideration of the spatial extent, duration, frequency and severity of the effect. Impact magnitude is assessed qualitatively according to the criteria defined in **Table 4.3**.

88. The following definitions apply to the time periods used in the magnitude assessment:

- Long term: Greater than 5 years.
- Medium term: 2 to 5 years
- Short term: Less than 2 years.

89. In this instance, for construction-related impacts, short term impact magnitude will relate to impacts that do not extend past the construction period.

Table 4.3 Criteria for appraisal of magnitude of the effect for land use receptors

Magnitude	Definition
High	Permanent / irreversible changes, over the whole receptor, affecting usability, risk, value over a wide area, or certain to affect regulatory compliance.
Medium	Moderate permanent or long-term reversible change changes, over the majority of the receptor, affecting usability, risk, value over the local area, possibly affecting regulatory compliance.
Low	Temporary change affecting usability, risk or value over the short-term or within the site boundary; measureable permanent change with minimal effect usability, risk or value; no effect on regulatory compliance.
Negligible	Minor permanent or temporary change, undiscernible over the medium- to long-term short-term, with no effect on usability, risk or value.

4.1.4 Significance

90. Following the identification of receptor value and 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 wherever relevant.

91. Assessment of impact significance is qualitative and reliant on professional experience, interpretation and judgement. The matrix should therefore be viewed as a framework to aid understanding of how a judgement has been reached, rather than as a prescriptive, formulaic tool.

Table 4.4 Impact Significance Matrix

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

Table 4.5 Impact Significance Definitions

Impact Significance	Definition
Major	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 exceedence of statutory objectives and / or breaches of legislation.
Moderate	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor	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.
No change	No impact, therefore no change in receptor condition.

92. Note that for the purposes of the EIA, major and moderate impacts are deemed to be 'significant'. Significant impacts are those which are likely to influence the outcome of the planning application. Adverse significant impacts may require mitigation that is difficult or expensive to achieve, whereas beneficial significant impacts contribute to the case in favour of the Proposed Development.

93. 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.

94. 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 is be an assessment of the post-mitigation residual impact.

4.2 Potential Impacts

4.2.1 Potential Impacts during Construction

4.2.1.1 Impact: Drainage

95. The excavation of the cable trench, earthworks associated with substation construction and the excavation and stockpiling of soils has the potential to cause an adverse impact to the natural and artificial field drainage systems during construction works.

4.2.1.1.1 Approach to assessment

96. The potential impacts of the excavation of the cable trench, earthworks associated with substation construction and the excavation and stockpiling of soils will be

assessed qualitatively. This assessment will be informed by the results of the desk based assessment outlined in **Section 3.2**. The approach to the assessment of impacts on drainage is discussed in more detail in the Onshore Water Resources and Flood Risk Method Statement.

4.2.1.2 Impact: Disruption to farming practices

97. All aspects of the onshore construction works have the potential to cause adverse impacts on farming and other land use practices through the temporary loss of land availability, restricted access and disruption caused by working areas and construction traffic.

98. The excavation of soils and earthworks associated with the onshore infrastructure has the potential to result in temporary loss of ALC land due to the removal of soil during excavation for onshore cable installation.

99. There is potential for adverse impacts to soil structure and future agricultural productivity of soils impacted during construction through the use of heavy machinery and disturbance. Ground conditions and potential contamination is discussed further in the 'Ground Conditions and Contamination Method Statement'.

4.2.1.2.1 Approach to assessment

100. The potential impacts of the onshore construction works on farming practices will be assessed qualitatively, informed by the results of the desk based assessment outlined in **Section 3.2** as well as consultations with farmers and questionnaires. All farmers who will be affected by the construction works will be consulted (ie all those whose land falls within the footprint of the onshore construction works).

101. The potential impacts of the excavation of soils and earthworks associated with the onshore infrastructure will be assessed qualitatively. This assessment will be informed by the results of the desk based assessment outlined in **Section 3.2**. The assessment will assume that any primary and tertiary mitigation measures incorporated into the scheme design will be in place, for example a Code of Construction Practice (CoCP) will be employed during site works to ensure that all appropriate good practice guidelines are followed.

102. The approach for the ground conditions assessment is discussed in more detail in the Onshore Ground Conditions and Contamination Method Statement.

4.2.1.3 Impact: Temporary closure of PRoWs/cycle paths

103. Closures of PRoWs and cycle paths and temporary alternative routes may be necessary during the construction period. The impacts of this on tourism and

recreation are discussed further in the Socioeconomics, Tourism and Recreation Method Statement.

4.2.1.3.1 Approach to assessment

104. The impacts of onshore construction works on PRoWs and cycle paths will be qualitatively assessed, informed by the desk based assessment outlined in **Section 3.2.** The assessment in relation to recreational activities associated with the PRoWs and cycle paths is discussed in more detail in the Socioeconomics, Tourism and Recreation Method Statement.

4.2.1.4 Impact: Existing utilities

105. Cable installation activity has the potential to impact on water, power and gas infrastructure.

106. Changes to ground levels beneath or close to existing overhead lines have the potential to reduce safety clearances for the overhead lines. In addition, there is the potential for ground levels above existing electricity cables to be altered.

107. Drilling or excavation work could have the potential to disturb or adversely affect the foundations of existing electricity towers.

108. There is the potential for adverse impacts relating to the gas pipeline that the onshore cable route is required to cross.

4.2.1.4.1 Approach to assessment

109. The impacts on existing utilities will be informed by the desk based assessment outlined in **Section 3.2** and in consultation with the National Grid.

110. The assessment will assume that any primary and tertiary mitigation measures incorporated into the scheme design will be in place, for example a Code of Construction Practice (CoCP) will be employed during site works to ensure that all appropriate good practice guidelines are followed. It will also be assumed that all relevant guidance in relation to working safely near to existing overhead lines is adhered to (contained within the Health and Safety Executive's (www.hse.gov.uk) Guidance Note GS 6 "Avoidance of Danger from Overhead Electric Lines").

4.2.1.5 Impact: Public health and safety

111. The EIA will focus on elements which could be of concern to members of the public, for example issues relating to invasive plant species, notifiable scheduled diseases and procedures required to prevent any health or safety issues arising in relation to

existing buried gas, electric and water services. Issues relating to public health are considered in the Health Method Statement.

4.2.1.5.1 Approach to assessment

112. The approach to the assessment of issues relating to public health is considered in the Health Method Statement.

4.2.2 Potential Impacts during O&M

113. Operation and maintenance activities will follow standard procedures to minimise potential impacts. In addition, non-routine maintenance will be subject to robust and effective planning and risk assessment procedures.

4.2.2.1 Impact: Drainage

114. Permanent infrastructure and hardstanding at the substation and cable relay station, plus the presence of buried cables has the potential to permanently impact upon land drainage. Impacts on drainage will be considered further in the Onshore Water Resources and Flood Risk Method Statement.

4.2.2.1.1 Approach to assessment

115. The potential impacts of permanent infrastructure on drainage will be assessed qualitatively. This assessment will be informed by the results of the desk based assessment outlined in **Section 3.2**. Further approach to the assessment of impacts on drainage is discussed in more detail in the Onshore Water Resources and Flood Risk Method Statement.

4.2.2.2 Impact: Disruption to farming practices / land use

116. There is the potential for farming practices to be restricted due to the presence of cables and access restrictions, and also where maintenance and repair works are being carried out along the cable route and on other onshore infrastructure.

117. There is also the potential for a permanent/long-term reduction in quality of ALC land along the cable route.

4.2.2.2.1 Approach to assessment

118. The potential impacts of the permanent onshore infrastructure will be assessed qualitatively. This assessment will be informed by the results of the desk based assessment outlined in **Section 3.2** as well as consultations with farmers and questionnaires. The assessment will assume that any primary and tertiary mitigation measures incorporated into the scheme design will be in place, for example the design of a cable route which, as far as possible, is kept close to field boundaries. The

assessment will cover all land within the footprint of the construction works, including access routes for construction machinery.

119. The approach for the ground conditions assessment is discussed in more detail in the Onshore Ground Conditions and Contamination Method Statement.

4.2.2.3 Impact: Permanent closure of PRoWs/cycle paths

120. PRoWs or cycle paths in the footprint of the substation have the potential to be permanently closed or redirected, however this will be avoided wherever possible through sensitive siting of onshore infrastructure.

4.2.2.3.1 Approach to assessment

121. Permanent closures of PRoWs and cycle paths and alternative routes may be necessary for the duration of the scheme operation. The approach to the assessment of impacts on tourism and recreation are discussed further in the Socioeconomics, Tourism and Recreation Method Statement.

4.2.2.4 Impact: Public health and safety

122. Issues of public concern and health such as EMF arising in relation to buried cables will be considered further in the Health Method Statement.

4.2.2.4.1 Approach to assessment

123. The approach to the assessment of this impact is considered further in the Health Method Statement.

4.2.2.5 Impact: Soil heating

124. Buried cable systems emit some heat, potentially causing impacts on soil characteristics and productivity. The electrical system is designed to minimise heat loss to a level which is not likely to affect crop growth. Any heating effect from the cables is likely to only affect the region immediately adjacent to and directly above the cable system.

4.2.2.5.1 Approach to assessment

125. The potential impacts of the buried cable on soil heating will be assessed qualitatively, informed by the results of the desk based assessment outlined in **Section 3.2.**

126. Ass this impact is only likely to affect a small area, the scope of the assessment will be restricted to the area directly above and immediately adjacent to the cable system.

4.2.3 Potential Impacts during Decommissioning

127. 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 the onshore cables will be removed from ducts and recycled, with the transition pits and ducts left in situ.

128. 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 would be provided.

129. It is anticipated that the decommissioning impacts will be similar in nature to those of construction.

4.2.4 Potential Cumulative Impacts

130. Onshore cumulative impacts will be considered as part of the EIA process. Any other project with the potential to result in impacts that may act cumulatively with Norfolk Vanguard will be identified during consultation as part of the EPP and following a review of available information. These projects will then be included in the CIA and therefore are scoped into the assessment.

131. The assessment would consider the potential for significant cumulative impacts to arise as a result of the construction, operation and decommissioning of Norfolk Vanguard in the context of other developments that are existing, consented or at application stage.

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