Norfolk Vanguard Offshore Wind Farm

Appendix 20.2

WFD Compliance Assessment

Environmental Statement

Volume 3 - Appendices

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Environmental Impact Assessment
Environmental Statement

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For and on behalf of Norfolk Vanguard Limited

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Glossary

A/HMWB	Artificial or Heavily Modified Water Body
AIS	Air Insulation Switchgear
CoCP	Code of Construction Practice
CIA	Cumulative Impact Assessment
CIRIA	Construction Industry Research and Information Association
CMS	Construction Method Statement
DCLG	Department for Communities and Local Government
DCO	Development Consent Order
Defra	Department for Environment, Food & Rural Affairs
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EC	European Commission
EIA	Environmental Impact Assessment
ES	Environmental Statement
ETG	Expert Topic Group
EU	European Union
FCERM	Flood and Coastal Erosion Risk Management
FRA	Flood Risk Assessment
FWMA	Flood and Water Management Act
GEP	Good Ecological Potential
GES	Good Ecological Status
HDD	Horizontal Directional Drilling
HDPE	High Density Polyethylene
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IDB	Internal Drainage Board
LNR	Local Nature Reserve
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
NV	Norfolk Vanguard
O&M	Operations and Maintenance
PDS	Project Design Statement
PEIR	Preliminary Environmental Information Report
PPG	Planning Practice Guidance
R&D	Research and Development
RBD	River Basin District
RBMP	River Basin Management Plan
RIGS	Regionally Important Geological Site
SAC	Special Area of Conservation
SNCI	Site of Nature Conservation Interest
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest

SuDS	Sustainable Drainage System
UKTAG	United Kingdom Technical Advisory Group
WCS	Worst Case Scenario
WFD	Water Framework Directive
WMA	Water Management Alliance (comprising a group of 5 Internal Drainage Boards (IDBs) operating in the Anglian Region. WMA members include Broads IDB, East Suffolk IDB, King's Lynn IDB, Norfolk Rivers IDB and South Holland IDB)

Terminology

Cable Relay Station	Primarily comprised of an outdoor compound containing reactors (also called inductors, or coils) and switchgear to increase the power transfer capability of the cables under the HVAC technology scenario as considered in the PEIR. This is no longer required for the project as the HVDC technology has been selected.
Jointing pit	Underground structures constructed at regular intervals along the cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	Where the offshore cables come ashore at Happisburgh South.
Link boxes	Underground chambers or above ground cabinets next to the cable trench housing low voltage electrical earthing links.
Mobilisation area	Areas approx. 100 x 100m used as access points to the running track for duct installation. Required to store equipment and provide welfare facilities. Located adjacent to the onshore cable route, accessible from local highways network suitable for the delivery of heavy and oversized materials and equipment.
Mobilisation zone	Area within which the mobilisation area will be located.
National Grid overhead line modifications	The works to be undertaken to complete the necessary modification to the existing 400kV overhead lines
National Grid substation extension	The permanent footprint of the National Grid substation extension
National Grid temporary works area	Land adjacent to the Necton National Grid substation which would be temporarily required during construction of the National Grid substation extension.
Necton National Grid substation	The existing 400kV substation at Necton, which will be the grid connection location for Norfolk Vanguard
Onshore 400kV cable route	Buried high-voltage cables linking the onshore project substation to the Necton National Grid substation
Onshore cable route	The 45m easement which will contain the buried export cables as well as the temporary running track, topsoil storage and excavated material during

	construction.
Onshore cables	The cables which take the electricity from landfall to the onshore project substation.
Onshore project area	All onshore electrical infrastructure (landfall; onshore cable route, accesses, trenchless crossing technique (e.g. Horizontal Directional Drilling (HDD)) zones and mobilisation areas; onshore project substation and extension to the Necton National Grid substation and overhead line modification).
Onshore project substation	A compound containing electrical equipment to enable connection to the National Grid. The substation will convert the exported power from HVDC to HVAC, to 400kV (grid voltage). This also contains equipment to help maintain stable grid voltage.
Running track	The track along the onshore cable route which the construction traffic would use to access workfronts
The Applicant	Norfolk Vanguard Limited
The project	Norfolk Vanguard Offshore Wind Farm, including the onshore and offshore infrastructure.
Transition pit	Underground structures that house the joints between the offshore export cables and the onshore cables.
Trenchless crossing zone (e.g. HDD)	Temporary areas required for trenchless crossing works.
Workfront	The 150m length of onshore cable route within which duct installation would occur

20 WATER FRAMEWORK DIRECTIVE COMPLIANCE ASSESSMENT

20.1 Introduction

1. This report aims to determine whether the onshore and offshore activities associated with the proposed Norfolk Vanguard Offshore Wind Farm (herein referred to as 'the project') are compliant with the Directive of the European Parliament and of the Council 2000/60/EC establishing a framework for community action in the field of water policy (generally known as the Water Framework Directive (WFD)).

2. A brief description of the project is provided in section 20.2 of this report. A more detailed description is provided in Chapter 5 Project Description of the Environmental Statement (ES).

3. The objectives of this compliance assessment are to:

- Identify water bodies that could potentially be affected by the project;
- Identify activities that could affect these WFD water bodies;
- Assess the potential for the proposed project activities to result in a deterioration in the status of WFD water bodies, or prevent status objectives being achieved in the future; and
- Determine the compliance of the project with the requirements of the WFD.

4. This report sits as an appendix to Chapter 20 Water Resources and Flood Risk, and has been prepared as part of the ES of the project to be submitted alongside the Development Consent Order (DCO) application.

20.1.1 The Water Framework Directive

20.1.1.1 Overview

5. The WFD was transposed into national law by means of the Water Environment (WFD) (England and Wales) Regulations 2003. These regulations have recently been updated by the Water Environment (WFD) (England and Wales) Regulations 2017. The WFD Regulations provide for the implementation of the WFD, from designation of all surface waters (rivers, lakes, transitional (estuarine) waters, coastal waters and ground waters) as water bodies, to the requirement to achieve Good Ecological Status (GES) or Good Ecological Potential (GEP).

6. Unlike the EU Birds and Habitats Directives (EC Directive on the Conservation of Wild Birds (2009/147/EC) and EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC), respectively), which apply only to designated sites, the WFD applies to all bodies of water, including those that are man-made.

The consideration of the proposals under the WFD will, therefore, apply to all water bodies that have the potential to be impacted by the project.

20.1.1.2 Surface waters

7. There are two separate classifications for surface water bodies (including rivers, lakes, transitional and coastal waters); ecological and chemical. For a water body to be in overall 'good' status, both ecological and chemical status must be at least 'good'. The ecological status of surface waters is classified using information on the biological, physico-chemical and hydromorphological quality of the body of water.

8. The ecological status of a surface water body is assessed according to:

- The condition of biological elements, for example fish, benthic invertebrates and other aquatic flora;
- The condition of supporting physico-chemical elements, for example thermal conditions, salinity, and concentrations of oxygen, ammonia and nutrients;
- Concentrations of specific pollutants, for example copper and other priority substances; and
- The condition of the hydromorphological quality elements, including morphological condition, hydrological regime and tidal regime.

9. Ecological status is recorded on the scale of high, good, moderate, poor or bad. 'High' denotes largely undisturbed conditions and the other classes represent increasing deviation from this natural condition, otherwise described as a 'reference condition'. The ecological status classification for the water body, and the confidence in this, is determined from the worst scoring quality element. This means that the condition of a single quality element can cause a water body to fail to reach its WFD classification objectives.

10. Chemical status is assessed by compliance with environmental standards for chemicals that are listed in the EC Environmental Quality Standards Directive (2008/105/EC). These chemicals include priority substances, priority hazardous substances, and eight other pollutants carried over from the Dangerous Substance Daughter Directives. Chemical status is recorded as 'good' or 'fail'. The chemical status classification for the water body is determined by the worst scoring chemical.

11. Where the hydromorphology of a surface water body has been significantly altered for anthropogenic purposes, it can be designated as an Artificial or Heavily Modified Water Body (A/HMWB). An alternative environmental objective, Good Ecological Potential (GEP) applies in these cases.

12. HMWBs are classified according to the 'mitigation measures approach' (UKTAG, 2013). This approach first assesses whether actions to mitigate the impact of

physical modification are in place to the extent that could reasonably be expected. If this mitigation is in place, then the water body may be classified as achieving 'good' or better ecological potential. If this level of mitigation is not in place, then the water body will be classed as 'moderate' or worse ecological potential. Before an overall ecological potential classification is applied, the second step is for the results of the mitigation measures assessment to be cross-checked with data from biological and physico-chemical assessments. This approach is known as the "Alternative Approach" and is defined in more detail in the WFD Common Implementation Strategy (EC, 2004). Checklists of mitigation measures have been developed based on the steps identified in the Alternative Approach to enable large numbers of heavily modified and artificial water bodies to be assessed consistently and across sectors (UKTAG, 2008).

13. The process of classifying ecological potential is based on an assessment of:

- Whether all appropriate measures have been taken to mitigate the modified or artificial hydromorphological characteristics of the water body;
- Whether these measures are functioning; and
- Whether all non-sensitive quality elements are at good status or better.

14. Where the Environment Agency has data for biological quality elements that show signs of damage from pressures other than hydromorphological alterations (for example, if the benthic invertebrate status is poor because of nutrient pressures) the ecological potential will be changed. To reflect this other pressure the water body will be labelled as having 'Poor Ecological Potential'. This is also true where data are available for physico-chemical quality elements.

15. In addition, some surface waters require special protection under other European legislation. The WFD therefore brings together the planning processes of a range of other European Directives, such as the revised Bathing Waters Directive (2006/44/EC) and the Habitats Directive. These Directives establish protected areas to manage water, nutrients, chemicals, economically significant species and wildlife, and have been brought in line with the planning timescales of the WFD.

20.1.1.3 Groundwater

16. Groundwaters are assessed in a different way to surface waters. Instead of GES and GEP, groundwaters are classified as either Poor or Good in terms of quantity (groundwater levels, flow directions) and quality (pollutant concentrations and conductivity). Again, UKTAG have provided guidance on how groundwater quantity and quality is assessed (UKTAG, 2012a; UKTAG, 2012b).

20.1.2 Roles and Responsibilities

17. The Environment Agency is the competent authority for WFD implementation in England, and therefore must assess schemes to ensure that they are compliant with the requirements of the WFD. The Environment Agency also acts as a consultee to other regulators and bodies in relation to WFD compliance and therefore, for the project, will advise the organisations involved in consenting the project on the requirements of the WFD.

18. Whilst the Environment Agency acknowledges that assessing schemes for WFD compliance is best aligned with the steps of an Environmental Impact Assessment (EIA), they recommend that a separate WFD compliance assessment is undertaken by the applicant to ensure all aspects of WFD are clearly and overtly considered.

20.1.3 Report Structure

19. This report is divided into seven sections:

- Section 20.1 (this section) describes the purpose of this report.
- Section 20.2 presents the background to the project and provides a brief overview of the project.
- Section 20.3 presents the WFD compliance assessment methodology that is used in this report.
- Section 20.4 presents the results of the screening exercise undertaken for Stage 1 of the WFD compliance assessment.
- Section 20.5 presents the results of the scoping exercise undertaken for Stage 2 of the WFD compliance assessment.
- Section 20.6 presents the results of the detailed assessment undertaken for Stage 3 of the WFD compliance assessment.
- Section 20.7 presents a summary of mitigation, improvements and monitoring, which comprises Stage 4 of the WFD compliance assessment.

20.2 Project Description

20. The project is an up to 1800MW capacity offshore wind farm (OWF) being developed by Norfolk Vanguard Limited. The project comprises both offshore and onshore elements. Offshore, the project comprises two distinct areas, Norfolk Vanguard (NV) East and NV West, which are located approximately 70km and 47km from the coast of Norfolk respectively (at the nearest points). The project would consist of between 90 and 257 wind turbines, each having a rated capacity of between 7 and 20MW, with a total installed capacity of up to 1,800MW. Turbines would either all be located within NV West or across both NV East and NV West. The offshore wind farm will be connected to the shore via offshore export cables. Onshore the project

will be situated within North Norfolk District Council, Breckland Council and Broadland District Council, and falls wholly within the authority of Norfolk County Council. The following elements of onshore infrastructure will be required in order to connect Norfolk Vanguard to the National Grid at the Necton National Grid substation and are referred to as the onshore project area:

- Landfall;
- Onshore cable route, accesses, trenchless crossing technique (e.g. Horizontal Directional Drilling (HDD)) zones and mobilisation areas;
- Onshore project substation; and
- Extension to the Necton National Grid substation and overhead line modifications.

20.2.1 Export Cable

21. The offshore cable corridor links the OWF sites with the landfall at Happisburgh South.

20.2.2 Landfall

22. At the landfall at Happisburgh South, the offshore cables will be required to be installed via HDD, to be jointed to the onshore cables at the transition pits on the landward side of the landfall zone.

20.2.1 Onshore Cable Route

23. The onshore cable route is approximately 60km in length and connects the landfall to the onshore project substation at Necton. The onshore cable route consists of HVDC onshore export cables within ducts, crossing through North Norfolk, Breckland and Broadland, in addition to the onshore 400kV cable route between the onshore project substation and existing Necton National Grid substation.

24. The onshore cable route is 45m wide, to include trenches for the onshore electrical cables to be installed in ducts (and the ducts for Norfolk Boreas, sister project to Norfolk Vanguard), a running track to deliver equipment to the installation site from mobilisation areas and storage areas for topsoil and subsoil.

20.2.2 Onshore Project Substation

25. The onshore project substation will be located in Breckland, and will consist of an HVDC substation.

26. The onshore project substation will include a fenced compound, buildings and outdoor equipment. The area of the compound will be approximately 300m x 250m

(based on the maximum parameters of an HVDC substation). The maximum height of the onshore project substation will be the lightning protection masts, with the main building heights being approximately 19m.

20.2.3 Extension to the Necton National Grid Substation

27. The existing Necton National Grid substation would require an extension to accommodate the Norfolk Vanguard connection points. The Necton National Grid substation would need to accommodate circuit breakers and associated busbar (metal bar that conducts electricity within a substation) structures which allow connection onto the existing 400kV overhead line for generation to be transmitted onto the wider National Grid system. In addition to the Necton National Grid substation itself, modifications to the existing overhead line structures adjacent to the substation would be required to provide a double turn-in arrangement[1].

28. The Necton National Grid substation outdoor busbar will be extended in a westerly direction to a total length of 340m (inclusive of existing Necton National Grid substation), with seven new AIS bays installed along the busbar extension for Norfolk Vanguard. For cumulative assessment purposes, five further AIS bays installed to the east will be required for Norfolk Boreas extension works with a total busbar length (Norfolk Vanguard extension, Norfolk Boreas extension and existing substation) of 470m.

29. The maximum height of the outdoor busbar and bays at the substation is estimated to be 15m.

30. Extension works are to be completed to facilitate only Norfolk Vanguard, including any temporary land requirements.

31. Two new overhead line towers will be required to accommodate Norfolk Vanguard and Norfolk Boreas in close proximity to the existing corner tower (to the north east of the existing Necton National Grid substation) with a maximum height of 55m. The existing corner tower will be demolished such that the net new number of towers is one. The design approach taken would be confirmed at detailed design phase, post consent.

20.2.4 Operations and Maintenance Phase

32. Once commissioned, the wind farm would operate for up to 30 years. All offshore infrastructure including wind turbines, foundations, cables and offshore substations would be monitored and maintained during this period in order to maximise

[1] Each overhead line tower carries two 400kV circuits. In this arrangement, both circuits are turned into the substation busbar structure.

efficiency. During the life of the project, repairs may be required and periodic inspection will be undertaken. Periodic surveys would also be required to ensure the cables remain buried and if they do become exposed, re-burial works would be undertaken.

33. There is no ongoing requirement to maintain the onshore cables following installation. Access to the onshore cable route will be required to conduct emergency repairs if necessary.

34. The onshore project substation would not be manned, however access would be required periodically for routine maintenance activities, estimated at an average of one visit per week.

20.2.5 Decommissioning Phase

35. The scope of the decommissioning works would be determined by the relevant legislation and guidance at the time of decommissioning and would most likely involve the accessible installed components. Offshore, this is likely to include removal of all of the wind turbine components, part of the foundations (those above seabed level), removal of some or all of the array cables, interconnector cables, and offshore export cables. Scour and cable protection would likely be left in situ.

36. The process for removal of foundations is generally the reverse of the installation process.

37. No decision has been made regarding the final decommissioning policy for the onshore cables, as it is recognised that industry best practice, rules and legislation change over time. It is likely that the onshore cables will be removed from the ducts and recycled, with the transition pits and ducts capped and sealed then left in situ.

38. The decommissioning methodology cannot be finalised until immediately prior to decommissioning, but would be in line with relevant policy at that time.

20.3 Assessment Method

39. This section sets out the approach for each of the key stages in the WFD compliance assessment process for the WFD compliance assessment. For each stage, a description of the procedure is provided, together with initial, relevant information that may facilitate decision-making at this early stage of the process.

20.3.1 The Approach to Assessing WFD Compliance

40. There is no detailed published methodology for the assessment of plans or projects in relation to undertaking WFD compliance assessments across all types of water bodies. There are, however, several sets of guidance that have been developed in

relation to undertaking such assessments in the different water body types, predominantly written by the Environment Agency. Considered to be the most relevant to the project are:

- Advice Note 18: The WFD (Planning Inspectorate, 2017), which provides an overview of the WFD and provides an outline methodology for considering WFD as part of the DCO process;
- WFD risk assessment: How to assess the risk of your activity (Environment Agency, 2016a), which provides guidance for bodies planning to undertake activities that would require a flood risk activity permit;
- Clearing the Waters For All (Environment Agency, 2016b), which provides guidance for undertaking activities within transitional and coastal water bodies; and
- Protecting and improving the water environment: WFD compliance of physical works in rivers (Environment Agency Position Statement 488_10, version 2) and associated supplementary guidance (Environment Agency, 2016c). These internal Environment Agency documents have been produced to guide WFD assessment of new physical modifications to surface waters.

41. For the purposes of undertaking this WFD compliance assessment, the broad methodologies outlined in the guidance documents listed above have been modified and brought together to undertake an assessment that covers all types of water bodies. The assessment process therefore follows the following four stages:

- Stage 1: Screening;
- Stage 2: Scoping;
- Stage 3: Detailed compliance assessment; and
- Stage 4: Summary of mitigation, improvements and monitoring.

42. These stages are described in more detail in the subsequent sections.

20.3.2 Stage 1: Screening

20.3.2.1 Aim of this stage

43. This stage collates all available baseline data that will be necessary to complete the WFD compliance assessment, i.e. to collate all information on the project, the baseline environment, the water bodies which could potentially be impacted by the project, and details of any other activities outside of the project which could also impact on the water bodies.

20.3.2.2 Method for the baseline collation stage

44. Stage 1 requires the following main tasks:

- Initial screening to identify relevant water bodies in the study area. Water bodies will be selected for inclusion in the early stages of the compliance assessment using the following criteria, with reference to the 2015 Anglian River Basin Management Plan (RBMP) (as presented in the online Catchment Data Explorer):
    - All surface water bodies that could potentially be directly impacted by the project.
    - Any surface water bodies that have direct connectivity (e.g. upstream and downstream) that could potentially be affected by the project.
    - Any groundwater bodies that underlie the project.
- Collection of water body baseline data, including on the type and status of each quality element and, if appropriate, reasons for failure and mitigation measures identified. These data will be collated from the 'Cycle 2 Extended Water Body Summary Report' for each respective water body, obtained from the Environment Agency.
- Collection of project baseline data, broken down in sufficient detail so that the compliance of each main project component can be considered in the assessment.
- Identification of new or planned activities in the area that could also affect water body status.

20.3.3 Stage 2: Scoping

20.3.3.1 Aim of this stage

45. This stage identifies whether there is potential for deterioration in water body status or failure to comply with WFD objectives for any of the water bodies identified in Stage 1. This stage considers potential non-temporary impacts and impacts on critical or sensitive habitats. This scoping assessment is undertaken separately for each water body and each activity.

46. Water bodies and activities can be scoped out of further assessment if it can be satisfactorily demonstrated that there will be no impacts. If impacts are predicted, it will be necessary to undertake a detailed compliance assessment.

20.3.3.2 Scoping method

47. The scoping exercise considers:

- The potential for deterioration in surface water body status (within and between status classes) by adversely affecting biological, hydromorphological and/or physico-chemical quality elements;

- The potential for deterioration in groundwater body status (within and between status classes) by adversely affecting quantitative and chemical quality elements;
- The potential for activities to prevent delivery of WFD status objectives by impacting upon proposed improvement measures or, in the case of A/HMWBs, mitigation measures already identified by the Environment Agency;
- The potential to incorporate the measures required to deliver status objectives included in the River Basin Management Plan(s);
- The potential for deterioration in critical and sensitive habitats, including designated sites and habitats with particular ecological importance. Reference will be made to the Shadow Habitats Regulations Assessment (HRA) where appropriate;
- The potential for deterioration in protected areas such as Bathing Waters and Shellfish Waters located within the water bodies. These will be considered within the WFD compliance assessment where relevant;
- The potential for the 'prevent or limit' objective of the Groundwater Daughter Directive not being achieved; and
- The potential risk of deterioration arising as a result of project activities, in addition to changes in status.

20.3.3.3 Scoping questions

48. This Stage 2 assessment considers the potential for each activity planned as part of the project to affect each quality element in turn, based on a series of trigger questions for the quality elements that are applicable in each type of water body. These are presented separately for rivers, transitional and coastal water bodies and groundwater in Annex 20.2.1.

49. The Stage 2 scoping questions are designed such that the size of risk associated with the activity (e.g. the likelihood and severity of any potential impact) is not central to the decision. If any risk is present, the quality element will be taken through to Stage 3 for further assessment.

50. In all cases, the water body and activity under assessment will be progressed to the detailed compliance assessment (Stage 3) if the answer to one or more of the scoping questions is 'Yes', but only for those quality elements that could potentially be impacted. Conversely, if the answer to a scoping question is 'No' or enough information can be provided at this stage to scope the issue out, the quality element is scoped out of further assessment. Note that activities will only be scoped out if there is clear, definitive evidence that they will not adversely affect a particular quality element.

51. The decisions recorded in the scoping tables are based on expert judgement, informed by available data and, in the case of hydromorphological impacts, using the guidance included in the Flood and Coastal Erosion Risk Management R&D Programme expert assessment framework (Defra and Environment Agency, 2009).

52. The end result of Stage 2 is a list of water bodies, project activities and quality elements to be carried forward for further consideration in the detailed assessment stage (Stage 3).

20.3.4 Stage 3: Detailed Compliance Assessment

20.3.4.1 Aim of this stage

53. The Stage 3 assessment determines whether the activities and/or project components that have been put forward from the Stage 2 scoping assessment will cause deterioration and whether this deterioration will have a significant non-temporary effect on the status of one or more WFD quality elements at water body level. For priority substances, the process requires the assessment to consider whether the activity is likely to cause the quality element to achieve good chemical status.

54. If it is established that an activity and/or project component is likely to affect status at water body level (that is, by causing deterioration in status or by preventing achievement of WFD objectives and the implementation of mitigation measures for HMWBs), or that an opportunity may exist to contribute to improving status at a water body level, potential measures to avoid the effect or achieve improvement must be investigated. This stage considers such measures and, where necessary, evaluates them in terms of cost and proportionality.

55. Note that this stage is referred to as a WFD Impact Assessment in the Planning Inspectorate (2017) guidance.

20.3.4.2 Method for the detailed compliance assessment

56. As outlined in section 20.5, the end result of Stage 2 is an agreed list of water bodies, project activities and quality elements to be carried forward for further assessment. Stage 3 then considers the potential for status deterioration associated with each project activity (i.e. not the project as a whole) on the biological, hydromorphological and physico-chemical and chemical quality elements of each relevant surface water body, and the quantitative and chemical quality elements of each relevant groundwater body.

57. The assessment establishes whether the project activities will:

- Cause deterioration within a water body;
- Prevent WFD status objectives (i.e. GES or GEP) being achieved, including prevention of the delivery of mitigation measures identified in the RBMP; and
- Prevent status objectives being achieved in any other water bodies, including prevention of the delivery of mitigation measures identified in the RBMP.

58. Following the broad principles of the WFD, the project is considered to be non-compliant if any of the project components are likely to cause a non-temporary deterioration in any of the quality elements individually or cumulatively at a water body level.

59. Impacts of the project on other European legislation, for example the Habitats Directive, Birds Directive, and Bathing Waters Directive (2006/7/EC), will also be considered in line with Articles 4.8 and 4.9 of the WFD. However, the majority of the assessments for these areas will be assessed within the shadow Habitats Regulations Assessment and ES (which accompany the project DCO application).

60. If, at the end of the Stage 3 assessment process, negative impacts have been identified, measures to mitigate the impacts and, if possible, to improve the state of the water environment need to be considered. Where possible, multiple benefits are sought from each measure (e.g. across different water bodies or improving more than one quality element). Appropriate guidance will be consulted, such as the online WFD Mitigation Measures Manual (Environment Agency, undated) and Estuary Edges: Ecological Design Guidance (Thames Estuary Partnership & Environment Agency, undated). The scope of all measures will be agreed in consultation with the appropriate regulatory authorities.

61. In the unlikely event that no suitable measures can be identified to mitigate the potential adverse impacts of the project, it may be necessary to undertake an Article 4.7 assessment (noting that the overall ethos of the project is to prevent deterioration in water body status and avoid the need for an application for an exemption under Article 4.7 of the WFD). To determine the scope of this assessment, consultation with the Environment Agency will be required and will include:

- An assessment of whether the project can be classified as being of imperative overriding public interest and if the benefits to society resulting from the project outweigh the local benefits of WFD implementation;
- An assessment of whether all practicable steps to avoid adverse impacts have been taken. These steps are defined as those that are technically feasible, not disproportionately costly, and compatible with the overall requirements of the project; and

- An assessment of whether the project can be delivered by an alternative, environmentally better option. This option will need to be technically feasible and not disproportionately costly to be feasible.

20.3.4.3 Determination of deterioration

62. Any deterioration identified must be considered within the context of the water body, in terms of the scale and magnitude of the impact as well as the timescales over which the impact would occur. This assessment will therefore differ depending on the nature of the water body (i.e. marine, freshwater or groundwater). The approach for undertaking the deterioration assessment is described in subsequent sections.

63. There is currently no clear guidance from the Environment Agency on how deterioration in the status of water bodies should be assessed. Expert judgement based on the information provided in the appropriate technical chapters of the ES (including Chapter 8 Marine Physical Processes, Chapter 9 Marine Water and Sediment Quality, Chapter 10 Benthic and Intertidal Ecology, Chapter 11 Fish and Shellfish Ecology, Chapter 19 Ground Conditions and Contamination, Chapter 20 Water Resources and Flood Risk and Chapter 22 Onshore Ecology) will therefore be used to determine whether any deterioration could occur.

64. The assessment will draw upon several existing guidance documents that have some application in the assessment of WFD compliance:

- The WFD (Standards and Classification) Directions (England and Wales (2015). This document provides the most up to date standards used to determine the ecological and chemical status of surface water bodies and quantitative and chemical status of groundwater.
- UKTAG (2011) Defining & Reporting on Groundwater Bodies. This document provides information on the approaches used to classify groundwater bodies.
- Joint Defra/EA Flood and Coastal Erosion Risk Management R&D Programme (2009) WFD Expert Assessment of Flood Management Impacts. This document provides a framework for the assessment of changes to hydromorphology.
- UKTAG (2003) Guidance on Morphological Alterations and the Pressures and Impacts Analyses. This document provides additional information on hydromorphological pressures.
- Internal Environment Agency guidance on WFD deterioration and risk to the status objectives of river water bodies (Environment Agency, 2016d; document reference 488_10_SD06). This document provides an assessment of the level of risk of deterioration in water body status associated with different activities, based upon activity type and risk screening thresholds.

65. Since the Environment Agency's policy of no deterioration applies to WFD compliance assessments, it is important to consider all levels of deterioration from short term impacts to potentially long term changes to water body status classifications. The assessment will therefore consider the potential for between class, within class and temporary deterioration in water body status. Where deterioration is not predicted, the activity will also be considered against the water body objectives to ensure status objectives (i.e. GES or GEP) will not be prevented.

20.3.5 Stage 4: Summary of Assessment and Mitigation Requirements

20.3.5.1 Aim of this stage

66. This stage of the process provides a summary of the preceding stages and any mitigation proposals for each of the activities assessed.

20.3.5.2 Method

67. This stage summarises the results of the assessment that is described in the previous sections. This summary includes:

- An overview of the results of the assessment, including whether project activities have been screened out, assessed in detail, or mitigated against;
- A description of the mitigation measures that are required to address any impacts, and prevent deterioration in status or failure to meet WFD objectives set for the relevant water bodies; and
- A description of any improvements that can be implemented as part of the project.

20.3.6 Consultation

68. Table 20.1 details the consultation with regards to this WFD compliance assessment undertaken to date.

Table 20.1 Summary of consultation responses

Consultee	Date	Response	Action
Secretary of State	November 2016 Issue of Scoping Opinion	The Secretary of State welcomes the proposal for a Flood Risk Assessment (FRA) and a WFD compliance assessment; these assessments should form an appendix to the ES. The scope of these assessments should be discussed and agreed with relevant consultees including the Environment Agency, the relevant internal drainage boards and local planning authorities. The WFD assessment should, as a minimum, include: • The risk of deterioration of any water body quality element to a lower status class; • Support for measures to achieve 'good' status (or potential) for water bodies; • How the application does not hinder or preclude implementation of measures in the RBMP to improve a surface water body or groundwater (or propose acceptable alternatives to meet RBMP requirements); and • The risk of harming any protected area.	This WFD compliance assessment considers all potential risks to water body quality element deterioration, mitigation measures, and protected areas.
Environment Agency	April 2017	*"The chapter is silent regarding the WFD obligation of 'no deterioration' in respect of coastal waters. There should be some discussion of this and how it applies to sensitivity and impact."*	No deterioration of coastal water bodies to be considered as detailed in method above.
Environment Agency	May 2017	Comfortable with the proposed crossing techniques (HDD for the River Wensum, River Bure, King's Beck and North Walsham & Dilham Canal), and trenchless for the other watercourses (including Wendling Beck and the Blackwater Drain). Incision rates in the channels are low, and 1.5m should be regarded as a suitable minimum burial depth. Sediment management has been recognised as an important focus area for the assessment. Sediment supply from all working areas (not just adjacent to watercourses) will be considered. Best practice techniques would be used to control runoff and sediment supply; the most appropriate techniques will be selected as the design progresses. General pollution prevention measures should be sufficient in most cases. Cumulative impacts from multiple crossings in the same catchment should be	The impacts of proposed trenched and trenchless watercourse crossings are described in section 20.5 and 20.6. Sediment management and pollution control measures are also described in these sections and Table 20.14.

Consultee	Date	Response	Action
		considered.	
Environment Agency	December 2017	Both during the works and immediately post works. Invasive non-native species are a significant concern in the aquatic environment – especially to WFD status and there is a risk of spreading crayfish plague – threatening our work to conserve the endangered white-clawed crayfish. Yet there are no control measures relating to preventing the spread of invasive species between crossing points and between catchments.	Suitable biosecurity protocols will be embedded into the project mitigation. This is detailed in Table 20.14. Further details with regards to mitigation measures implemented to prevent the spread and propagation of invasive non-native species are included in Chapter 22 Onshore Ecology.
		…damming and diverting of the watercourses are mentioned as a control measure, these activities have an impact which needs to be assessed as part of the WFD compliance assessment. Damming watercourses have potential impacts for fish and diverting water can transfer of non-native invasive species.	Embedded mitigation regarding damming and diverting of watercourses to mitigate impacts upon ecology are detailed in Table 20.14.
		… [It is stated that] the impacts to the biology quality elements e.g. invertebrates and macrophytes will be prevented by the embedded mitigation. The embedded mitigation is not adequate, and there will be unavoidable localised impacts which may cause WFD deterioration.	It is assessed that the further detail regarding embedded mitigation provided in the ES, including detailed information in Chapter 5 Project Description and Chapter 22 Onshore Ecology, demonstrate that although localised impacts will occur, these will not cause WFD deterioration.
		No waterbodies or activities have been selected for further assessment at Stage 3 of WFD compliance assessment, yet the answer to the scoping questions is yes in Table 20.2.1. This doesn't follow the methodology properly which was set out in 20.3.3.3. Our guidance 488_10 which was referenced states that impacts on priority habitats and species must be considered, this is not addressed in the WFD compliance assessment. Opportunities to improve the water environment have not been sought as set out in 488_10. Creating a new cable route crossing on this scale, are not low risk activities and therefore, the impacts of these activities must be assessed at stage 3 – further assessment.	A Stage 3 Detailed Compliance Assessment has been undertaken for three river water bodies and one coastal water body. Potential improvement opportunities have been described in Table 20.14.

Consultee	Date	Response	Action
		It is important that any approach to assessing the impact upon watercourses recognises and accounts for the key requirement of WFD objectives that there should be 'no deterioration in overall WFD status or in the individual WFD elements.	These principles are followed in the assessment method set out in section 20.3.
		Where WFD identifies that a water body is failing, this presents an opportunity for mitigation and enhancement.	Opportunities to deliver improvements to water body status through the sensitive reinstatement of the bed and banks at open cut trench crossings will be explored.
		If the construction footprint is greater than 1% of habitats then more information is required to estimate the extent and duration of any deterioration in WFD quality elements due to the temporary disturbance, as well as from any permanent habitat loss. It would be acceptable to provide a link to evidence contained in the relevant chapter	Considered in section 20.6 Detailed Compliance Assessment
		Separate scoping assessments have been provided for 3 different aspects of the project: landfall, the installation of the offshore export cables, and presence of offshore cable protection. You should confirm if the impacts from these activities will overlap in time and if so provide the cumulative footprint within the waterbody of the impacted area to compare against the scoping thresholds.	Considered in section 20.6.7 Cumulative Assessment
		The tidal regime should be considered for transitional and coastal waters. Not just coastal.	Included in Annex 20.2.1.

20.4 Stage 1: Screening

20.4.1 Purpose of this Section

69. This section describes the baseline characteristics of the WFD receptors that are hydraulically connected to the onshore project area, against which potential impacts on WFD compliance will be assessed. The section includes a description of the project and provides a summary of the main characteristics of the water bodies that could be impacted by the project.

20.4.2 Identification of Water Bodies

70. The water bodies that could potentially be affected by the project have been identified using the method outlined in section 20.3, building upon:

- Knowledge of the current project proposals;
- High level guidance already provided by the Environment Agency; and
- The information included on water body extent in the Catchment Data Explorer (http://environment.data.gov.uk/catchment-planning).

71. Figures 20.2-20.4 show the WFD water bodies screened into the WFD compliance assessment. These water bodies are described below in Table 20.2.

Table 20.2 WFD water bodies screened into the WFD compliance assessment

Water body name and WFD reference	Water body type	Status and comments
East Ruston Stream (GB105034055670)	River	Heavily Modified Water Body due to its ongoing land drainage function. The water body is currently at Moderate Ecological Potential as a result of low dissolved oxygen concentrations and pressures on fish populations.
New Cut (GB105034050940)	River	Artificial Water Body which is currently at Good Ecological Potential.
North Walsham and Dilham Canal (disused) (GB105034055710)	River	Designated as Heavily Modified due to ongoing land drainage, flood protection and recreational uses. The water body is currently at Bad Ecological Potential as a result of pressures on fish and macrophyte populations.
King's Beck (GB105034055730)	River	Heavily Modified due to its ongoing land drainage function. The water body is currently at Moderate Ecological Potential as a result of pressures on fish and macrophyte populations.
Scarrow Beck (GB105034055740)	River	Heavily Modified Water Body due to its ongoing land drainage function. The water body is currently at Moderate Ecological Potential as a result of the in-channel morphological diversity mitigation measure not in place due to being disproportionately expensive.
Bure (u/s confluence with Scarrow Beck)	River	Not designated as a Heavily Modified Water Body. The water body is currently at Poor Ecological Status as a result of

Water body name and WFD reference	Water body type	Status and comments
(GB105034055690)		pressures on macrophytes and phytobenthos.
Bure (Scarrow Beck to Horstead Mill) (GB105034050932)	River	Designated as a Heavily Modified Water Body due to its ongoing recreational usage. The water body is currently at Moderate Ecological Potential as a result of pressures on fish and macrophyte populations.
Mermaid Stream (GB105034050900)	River	Heavily Modified due to its ongoing land drainage function. The water body is currently at Moderate Ecological Potential as a result of pressures on fish and a lack of measures to improve geomorphological diversity.
Wensum (to Tatterford) (GB105034051111)	River	Heavily Modified Water Body due to its ongoing land drainage function. The water body is currently at Moderate Ecological Potential as a result of the in-channel morphological diversity, habitat retention and minimising the habitat impact of maintenance mitigation measures not in place due to being disproportionately expensive.
Wensum US Norwich (GB105034055881)	River	Designated as a Heavily Modified Water Body on account of its ongoing flood protection function. The water body is currently at Moderate Ecological Potential as a result of hydromorphological modifications and pressures on phytobenthos.
Blackwater Drain (Wensum) (GB105034051120)	River	Heavily Modified due to its ongoing land drainage function. The water body is currently at Moderate Ecological Potential as a result of pressures on fish and macrophytes.
Blackwater (Wendling Beck) (GB105034051050)	River	Not designated as a Heavily Modified Water Body. The water body is currently at Poor Ecological Status as a result of pressures on macrophytes and phytobenthos.
Foulsham Tributary (GB105034055850)	River	Heavily Modified due to its ongoing land drainage function. The water body is currently at Moderate Ecological Potential as a result of the in-channel morphological diversity mitigation measure not in place due to being disproportionately expensive.
Little Ryburgh Tributary (GB105034055860)	River	Heavily Modified due to its ongoing land drainage function. The water body is currently at Moderate Ecological Potential as a result of the in-channel morphological diversity mitigation measure not in place due to being disproportionately expensive.
Wissey - Upper (GB105033047890)	River	Not designated as a Heavily Modified Water Body. The water body is currently at Moderate Ecological Status as a result of modifications to the hydrological regime, high phosphate concentrations, and pressures on macrophytes and phytobenthos.
Wendling Beck (GB105034051020)	River	Designated as a Heavily Modified Water Body as a result of ongoing land drainage and flood protection functions. The water body is currently at Good Ecological Potential, although

Water body name and WFD reference	Water body type	Status and comments
		pressures on fish and macrophytes are identified in the RBMP.
Nar Upstream of Abbey Farm (GB105033047791)	River	Not designated as a Heavily Modified Water Body. The water body is currently at Good Ecological Status.
Bure (Horstead Mill to St Benet's Abbey (GB105034050931)	River	Designated as a Heavily Modified Water Body as a result of ongoing recreation and urbanisation functions. The water body is currently at Moderate Ecological Potential as a result of pressures on dissolved oxygen and temperature, and mitigation measures being disproportionately expensive.
Broadland Rivers Chalk & Crag (GB40501G400300)	Groundwater	Underlies the majority of the area of the onshore project area. The water body is currently at Poor Quantitative Status as a result of groundwater abstraction and Poor Chemical Status as a result of diffuse pollution pressures and potential impacts on a Drinking Water Protected Area.
Cam and Ely Ouse Chalk (GB40501G400500)	Groundwater	Underlies the majority of the area of the substation project area. The water body is currently at Poor Quantitative Status and Poor Chemical Status as a result of diffuse pollution pressures and potential impacts on a Drinking Water Protected Area and general chemical testing.
North Norfolk Chalk (GB40501G400100)	Groundwater	Underlies the landfall area of the substation project area. The water body is currently at Good Quantitative Status and Poor Chemical Status as a result of general chemical testing.
North West Norfolk Chalk (GB40501G400200)	Groundwater	Underlies an area immediately north of the substation project area. The water body is currently at Poor Quantitative Status as a result of an unfavourable water balance and Poor Chemical Status as a result of general chemical testing.
Norfolk East (GB650503520003)	Coastal	Heavily modified for flood and coastal protection. The water body is currently at Moderate Ecological Potential as a result of elevated concentrations of dissolved inorganic nitrogen due to continuous sewage discharge and arable land management practises.
Blakeney Spit Lagoon (GB610050082000)	Coastal (lagoon)	Designated as an artificial water body. The water body is currently at Good Ecological Status.
Norfolk North (GB640503300000)	Coastal	Heavily modified for flood protection. The water body is currently at Moderate Ecological Potential as a result of elevated concentrations of dissolved inorganic nitrogen.

72. Data for assessment for each of the water bodies was obtained from the second River Basin Management Plan status objectives published by the Environment Agency in February 2016, as presented in the online Catchment Data Explorer[2] and

[2] Available online at http://environment.data.gov.uk/catchment-planning/

the 'Cycle 2 Extended Water Body Summary Report' produced for each water body by the Environment Agency (Environment Agency, 2016e).

73. Protected areas in relation to the project are shown in Figure 20.5.

20.4.3 Potential Impacts of the Project

74. Detailed information on the scale and nature of project-related effects is available in Chapter 5 Project Description of the ES. However, on the basis of the range of activities associated with the project, Table 20.3 and Table 20.4 set out examples of the types of effects potentially relevant to the WFD compliance assessment that could be expected within the construction and operation phases. It should be noted that these impact mechanisms are theoretical and do not necessarily indicate that an effect will occur, nor is the list exhaustive.

75. It may be possible for relatively straightforward reasons (e.g. no identifiable impact pathway) to scope out some project activities during Stage 2. However, to do so will require sufficient project information to be available that allows reasoned and clear conclusions to be reached. Where there is uncertainty over the potential for an activity to have an effect then a precautionary view will be taken and the activity will be screened in for further assessment.

Table 20.3 List of project activities and potential impact mechanisms during construction

Activity	Potential mechanisms for impact on WFD quality elements
Initial site preparation, earthworks and works associated with all onshore infrastructure (i.e. onshore project substation, landfall and cable installation), including the stockpiling of materials and installation works	Changes in surface water quality, quantity and distribution associated with land use change from natural vegetated surface to hard standing (hydromorphology), sediment laden run off (hydromorphology, physico-chemistry), changes in surface water chemistry due to changes in the proportion of water received from different sources (physico-chemistry) and changes in water quality associated with leakage or accidental spills of fuels, oils, lubricants and construction materials (physico-chemistry and priority substances). Changes in infiltration to the groundwater body (groundwater quantity) and potential for ingress of spilled contaminants (groundwater quality). Changes to the volume and distribution of surface water flows, with the potential for hydromorphological adjustment (hydromorphology). Hydromorphological and physico-chemical changes could have direct effects on biological elements. Increase in sediment from wind-blown dust derived from disturbed ground (hydromorphology).
Watercourse crossings using trenching technique	Direct changes to bed and bank habitats (hydromorphology, biology). Changes to the volume and distribution of surface water flows, with the potential for hydromorphological adjustment (hydromorphology).

Activity	Potential mechanisms for impact on WFD quality elements
	Changes in water quality associated with leakage or accidental spills of fuels, oils, lubricants and construction materials (physico-chemistry and priority substances). Hydromorphological and physico-chemical changes could have direct effects on biological elements.
Watercourse crossings using trenchless technique	Changes in water quality associated with leakage or accidental spills of fuels, oils, lubricants and construction materials (physico-chemistry and priority substances). Physico-chemical changes could have direct effects on biological elements.
Works associated with the connection of the cable at the landfall	Potential to create a localised increase in suspended sediment concentration since works will be undertaken within the water under the utilisation of the long HDD technique (physico-chemistry and biology).
Installation of the offshore export cable	Potential temporary impact associated with resuspension of sediment as a result of ploughing and jetting activities (physico-chemistry and biology).

Table 20.4 List of project activities and potential impact mechanisms during operation

Activity	Potential mechanisms for impact on WFD quality elements
Presence of cable ducting	Changes in infiltration to the groundwater body (groundwater quantity). Changes to groundwater flows associated with the installation of buried infrastructure, which has the potential to change subsurface flow routes and change the distribution of groundwater (groundwater quantity).
Operational works and maintenance of onshore cable route	Changes in surface water chemistry due to changes in water quality associated with runoff and leakage or accidental spills of fuels, oils, lubricants and other potential contaminants (physico-chemistry and priority substances) and sediment laden run off (hydromorphology, physico-chemistry). Hydromorphological and physico-chemical changes could have direct effects on biological elements.
Presence of infrastructure (landfall and onshore project substation)	Changes to the volume and distribution of surface water flows, with the potential for hydromorphological adjustment (hydromorphology). Changes in surface water quality, quantity and distribution associated with discharge of site runoff into the surface drainage network (hydromorphology, physico-chemistry). Changes in surface water chemistry due to changes in the proportion of water received from different sources (physico-chemistry) and changes in water quality associated with runoff and leakage or accidental spills of fuels, oils, lubricants and

Activity	Potential mechanisms for impact on WFD quality elements
	other potential contaminants (physico-chemistry and priority substances). Hydromorphological and physico-chemical changes could have direct effects on biological elements. Changes in infiltration to the groundwater body (groundwater quantity) and potential for ingress of road-related contaminants (groundwater quality). Changes to groundwater flows associated with the installation of surface infrastructure, which has the potential to change surface and subsurface flow routes and change the distribution of groundwater.
Presence of offshore cable protection	Potential hydrodynamic impacts associated with the presence of the offshore cable protection. Potential loss of marine habitat associated with the presence of the offshore cable protection (biological parameters).

20.4.4 Initial Screening of Water Bodies

76. A screening exercise has been undertaken to identify which of the water bodies described in section 20.4.2 (Figures 20.2 – 20.4) have the potential to be impacted by the activities described in section 20.4.3. The results of this exercise are shown in Table 20.5.

77. This initial screening exercise is based upon identifying where activities associated with the project create potential mechanisms for direct and indirect impacts upon WFD water bodies, or in the case of river water bodies, within the water body catchment. It should be noted that for the purposes of this assessment, potential mechanisms for impact are not considered sufficiently large to result in impacts to upstream and downstream water bodies.

78. With regards to coastal and transitional water bodies, the distance between the works and coastal and transitional water bodies to the north of the project result in no potential mechanisms of impact.

79. The screening exercise demonstrates that the following water bodies could potentially be impacted by the project, and therefore need to be considered in the Stage 2 scoping assessment:

- River water bodies:
    - East Ruston Stream (GB105034055670).

- New Cut (GB105034050940).
- North Walsham and Dilham Canal (disused) (GB105034055710).
- King's Beck (GB105034055730).
- Bure (Scarrow Beck to Horstead Mill) (GB105034050932).
- Mermaid Stream (GB105034050900).
- Wensum US Norwich (GB105034055881).
- Blackwater Drain (Wensum) (GB105034051120).
- Wissey - Upper (GB105033047890.
- Wendling Beck (GB105034051020).

- Groundwater bodies:
  - Broadland Rivers Chalk & Crag (GB40501G400300).
  - Cam and Ely Ouse Chalk (GB40501G400500).
  - North Norfolk Chalk (GB40501G400100).
- Coastal water bodies:
  - Norfolk East (GB650503520003).

80. Table 20.5 also demonstrates that there are no project activities that could potentially impact upon the following water bodies, and are therefore screened out of the Stage 2 scoping assessment:

- River water bodies:
  - Scarrow Beck (GB105034055740).
  - Bure (u/s confluence with Scarrow Beck) (GB105034055690).
  - Wensum (to Tatterford) (GB105034051111).
  - Blackwater (Wendling Beck) (GB105034051050).
  - Foulsham Tributary (GB105034055850).
  - Little Ryburgh Tributary (GB105034055860).
  - Nar Upstream of Abbey Farm (GB105033047791).
  - Bure (Horstead Mill to St Benet's Abbey (GB105034050931).
- Groundwater bodies:
  - North West Norfolk Chalk (GB40501G400200).
- Coastal water bodies:
  - Blakeney Spit Lagoon (GB610050082000).
  - Norfolk North (GB640503300000).

Table 20.5 Results of screening exercise

Water body name and ID number	Type	Screened in?	Justification
East Ruston Stream (GB105034055670)	River	Yes	Screened in because the activities proposed within the catchment of this water body (including cable installation and watercourse crossings using trenched techniques) could potentially impact upon water body status.
New Cut (GB105034050940)	River	Yes	Screened in because the activities proposed within the catchment of this water body (including cable installation) could potentially impact upon water body status.
North Walsham and Dilham Canal (disused) (GB105034055710)	River	Yes	Screened in because the activities proposed within the catchment of this water body (including cable installation and watercourse crossings using trenched and trenchless techniques) could potentially impact upon water body status.
King's Beck (GB105034055730)	River	Yes	Screened in because the activities proposed within the catchment of this water body (including cable installation and watercourse crossings using trenched techniques) could potentially impact upon water body status.
Bure (Scarrow Beck to Horstead Mill) (GB105034050932)	River	Yes	Screened in because the activities proposed within the catchment of this water body (including cable installation and watercourse crossings using trenched and trenchless techniques) could potentially impact upon water body status.
Mermaid Stream (GB105034050900)	River	Yes	Screened in because the activities proposed within the catchment of this water body (including cable installation) could potentially impact upon water body status.
Wensum US Norwich (GB105034055881)	River	Yes	Screened in because the activities proposed within the catchment of this water body (including cable installation and watercourse crossings using trenched and trenchless techniques) could potentially impact upon water body status.
Blackwater Drain (Wensum) (GB105034051120)	River	Yes	Screened in because the activities proposed within the catchment of this water body (including cable installation and watercourse crossings using trenched techniques) could potentially impact upon water body status.
Wissey - Upper (GB105033047890)	River	Yes	Screened in because the activities proposed within the catchment of this water body (including substation infrastructure development and watercourse crossings using

Water body name and ID number	Type	Screened in?	Justification
			trenched techniques) could potentially impact upon water body status.
Wendling Beck (GB105034051020)	River	Yes	Screened in because the activities proposed within the catchment of this water body (including cable installation and watercourse crossings using trenched techniques) could potentially impact upon water body status.
Scarrow Beck (GB105034055740)	River	No	Screened out due to a lack of hydrological connectivity between the project works and this water body.
Bure (u/s confluence with Scarrow Beck) (GB105034055690)	River	No	Screened out due to a lack of hydrological connectivity between the project works and this water body.
Wensum (to Tatterford) (GB105034051111)	River	No	Screened out due to a lack of hydrological connectivity between the project works and this water body.
Blackwater (Wendling Beck) (GB105034051050)	River	No	Screened out due to a lack of hydrological connectivity between the project works and this water body.
Foulsham Tributary (GB105034055850)	River	No	Screened out due to a lack of hydrological connectivity between the project works and this water body.
Little Ryburgh Tributary (GB105034055860)	River	No	Screened out due to a lack of hydrological connectivity between the project works and this water body.
Nar Upstream of Abbey Farm (GB105033047791)	River	No	Screened out due to a lack of hydrological connectivity between the project works and this water body.
Bure (Horstead Mill to St Benet's Abbey (GB105034050931)	River	No	Screened out due to a lack of hydrological connectivity between the project works and this water body.
Broadland Rivers Chalk & Crag (GB40501G400300)	Groundwater	Yes	Screened in as the majority of the onshore cable route is located within this groundwater body.

Water body name and ID number	Type	Screened in?	Justification
Cam and Ely Ouse Chalk (GB40501G400500)	Groundwater	Yes	Screened in as the landfall area is located within this groundwater body.
North Norfolk Chalk (GB40501G400100)	Groundwater	Yes	Screened in as the majority of the substation area is located within this groundwater body.
North West Norfolk Chalk (GB40501G400200)	Groundwater	No	Screened out as no project works will be undertaken within this water body.
Norfolk East (GB650503520003)	Coastal	Yes	Screened in because of the potential impacts of the activities associated with the landfall and export cable installation required within this water body.
Blakeney Spit Lagoon (GB610050082000)	Coastal (Lagoon)	No	Screened out due to a lack of hydrological connectivity between the project works and this water body.
Norfolk North (GB640503300000)	Coastal	No	Screened out due to distance of WFD water body from construction activities

20.5 Stage 2: Scoping

20.5.1 Purpose of this Section

81. This section presents the results of the scoping assessment undertaken on the water bodies identified in section 20.4.4 of this report, using the method outlined in section 20.3.3.

82. This assessment examines the potential for activities associated with the project to impact upon WFD quality elements and overall water body status. It therefore identifies which water bodies are potentially impacted by the project and which quality elements are at risk of impact. The results of this assessment determine which water bodies will require further assessment (Stage 3 detailed compliance assessment).

83. The scoping assessment was undertaken for the water bodies identified at the outcome of Stage 1, detailed in section 20.4.4. With regards to the potential for activities to impact upon the Norfolk East coastal water body, this is assessed in Annex 20.2.3, using the standardised template provided by the Environment Agency for assessing impacts upon coastal water bodies.

20.5.2 Construction Impacts

20.5.2.1 Initial site preparation, earthworks and works associated with all onshore developments (i.e. onshore project substation, landfall and cable installation), including the stockpiling of materials and installation works

84. Table 20.6 demonstrates that onshore construction activities, including initial site preparation, earthworks and works associated with all onshore developments (i.e. onshore project substation, landfall and cable installation), including the stockpiling of materials and installation works have the potential to impact upon the hydromorphology, physico-chemistry and biology of the water bodies in which these activities will take place.

85. With regards to hydromorphology, there is potential for impacts on the hydrological regime and morphological conditions of the river water bodies as a result of:

- Alteration of surface water flows entering river water bodies as a result of changes in land use during the construction of the landfall and onshore project substation. This could impact upon the hydrology of the surface water system.
- Increased sediment supply to surface waters through erosion of exposed soils along the cable corridor and within the landfall and onshore project substation sites by surface runoff, which could impact upon the hydromorphology of the river water bodies.

86. With regards to physico-chemistry, there is potential for impacts on the oxygenation conditions, salinity and acidification status of the river water bodies as a result of:

- Increased sediment supply to surface waters through erosion of exposed soils by surface runoff, which could impact upon surface water quality.
- Supply of contaminants to surface waters through surface runoff or accidental spillage during excavation of contaminated soils, or accidental spillage or leakage of fuel oils or lubricants from construction vehicles, which could impact upon surface water quality.

87. With regards to biology, there is potential for impacts on aquatic flora, benthic invertebrate fauna and fish fauna in the river water bodies as a result of the potential changes to hydromorphology and physico-chemistry described above.

88. These activities have therefore been scoped in to Stage 3 of the assessment for the following water bodies:

- East Ruston Stream;
- New Cut;
- North Walsham and Dilham Canal (disused);
- King's Beck;
- Bure (Scarrow Beck to Horstead Mill);
- Mermaid Stream;
- Wensum US Norwich;
- Blackwater Drain (Wensum);
- Wendling Beck; and
- Wissey – Upper.

89. Table 20.7 demonstrates that, due to their size relative to the scale of the water body, the onshore construction activities do not have potential to impact upon the quantity or quality of groundwater. The following water bodies have therefore been screened out of the assessment at this stage:

- Broadland Rivers Chalk & Crag;
- Cam and Ely Ouse Chalk; and
- North Norfolk Chalk.

Table 20.6 Onshore construction activities: Scoping questions for river water bodies

Parameter	Scoping question	Answer	Water bodies
Biology			
Aquatic flora	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or	Yes	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck

Parameter	Scoping question	Answer	Water bodies
	modification of habitats for aquatic plants?		Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	-
Benthic invertebrates	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or modification of habitats for aquatic invertebrates?	Yes	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	-
Fish	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or modification of shelter, feeding and spawning habitats for fish?	Yes	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	-
Hydromorphology			
Hydrological regime	Could the activity change the volume, energy or distribution of flows in the water body?	Yes	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	-
Morphological conditions	Could the activity change the width, depth, bank conditions, bed substrates and structure of the riparian zone?	Yes	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck

Parameter	Scoping question	Answer	Water bodies
			Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	-
River continuity	Could the activity create a permanent barrier to the downstream movement of water and/or sediment, or the upstream movement of fish?	Yes	-
		No	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
Physico-chemistry			
General	Could the activity change the temperature, pH, oxygenation, salinity or nutrient concentrations in the water body?	Yes	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	-
Specific pollutants	Could the activity release dangerous chemicals into the water body?	Yes	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	-
Protected Areas			
Protected	Is the activity within 2km of a	Yes	Wensum US Norwich

Parameter	Scoping question	Answer	Water bodies
Areas	protected area?	No	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
Improvement measures and mitigation measures			
Improvement measures (non-A/HMWBs) and mitigation measures (A/HMWBs)	Is the activity likely to impact on one of the improvement or mitigation measures in place?	Yes	-
		No	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
	Is the activity likely to prevent the delivery or effectiveness of one of the improvement or mitigation measures that is not yet in place?	Yes	-
		No	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper

Table 20.7 Onshore construction activities: Scoping questions for groundwater bodies

Parameter	Scoping question	Answer	Water bodies
Groundwater quantity	Will the activity change groundwater levels affecting Groundwater Dependent Terrestrial Ecosystems (GWDTEs) or dependent surface water features?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activity lead to saline intrusion?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk

Parameter	Scoping question	Answer	Water bodies
	Will the level of proposed groundwater abstraction (dewatering) exceed recharge at a water body scale?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activity lead to an additional surface water body that will become non-compliant and lead to failure of the Dependent Surface Water test?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activity result in additional abstraction that will exceed any groundwater body scale headroom between the Fully licensed quantity and the limit imposed by the total recharge?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
Groundwater quality	Will the activities have the potential to result in or exacerbate widespread diffuse pollution at a water body scale?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activities have the potential to result in pollution of groundwater dependent terrestrial ecosystems (GWDTEs) or other dependent surface water features?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activity lead to saline intrusion?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activities have the potential to cause deterioration in the quality of a drinking water abstraction?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activities have the potential to result in increasing trends in pollutant concentrations or reduce the ability of the water body being able to reverse significant trends in groundwater pollutants?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activities result in the failure of the 'prevent or limit' objective of the Groundwater Daughter Directive?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk

20.5.2.2 Watercourse crossings

90. Table 20.8 demonstrates that the onshore cable route will need to cross a number of surface water body catchments, and therefore has the potential to impact upon the hydromorphology, physico-chemistry and biology quality elements of the water bodies in which these activities will take place.

91. With regards to hydromorphology, there is potential for watercourse crossings to impact upon on the hydrological regime, morphological conditions and river continuity of the river water bodies as a result of:

- Alterations to the geomorphology of the watercourse by disrupting flow conveyance and sediment transport (particularly of coarse bed sediments), for example via damming and diverting or culverting techniques, and cause localised disruption to the bed and banks, as a result of open trench cutting.
- Reduction in flow and sediment conveyance, creation of upstream impoundment, and encouragement of fine sedimentation as a result of temporary dams and culverts installed during trenching or along the running track. The dams could also act as a barrier to the movement of fish and other aquatic organisms.
- Alteration of surface water flows as a result of impoundment by temporary dams or culverts during the works in the water bodies. This could impact upon the hydrology of the surface water system, change patterns of erosion and sedimentation, and impede river continuity.

92. With regards to physico-chemistry, there is potential for impacts on the oxygenation conditions, salinity and acidification status of the river water bodies as a result of the supply of contaminants to surface waters through surface runoff or accidental spillage during excavation of contaminated soils, or accidental spillage or leakage of fuel oils or lubricants from construction vehicles, which could impact upon surface water quality.

93. With regards to biology, there is potential for impacts on quality elements such as aquatic flora, benthic invertebrate fauna and fish fauna in the river water bodies as a result of the potential changes to hydromorphology and physico-chemistry described above.

94. These activities have therefore been screened in to Stage 3 of the assessment for the following water bodies:

- East Ruston Stream;
- New Cut;
- North Walsham and Dilham Canal (disused);
- King's Beck;

- Bure (Scarrow Beck to Horstead Mill);
- Mermaid Stream;
- Wensum US Norwich;
- Blackwater Drain (Wensum);
- Wendling Beck; and
- Wissey – Upper.

95. However, there are no watercourse crossings in the New Cut and Mermaid Stream water bodies, and they have therefore been scoped out of the assessment at this stage.

96. Table 20.9 demonstrates that watercourse crossings do not have potential to impact upon the quantity or quality of groundwater. The following water bodies have therefore been scoped out of the assessment at this stage:

- Broadland Rivers Chalk & Crag;
- Cam and Ely Ouse Chalk; and
- North Norfolk Chalk.

Table 20.8 Watercourse crossings: Scoping questions for river water bodies

Parameter	Scoping question	Answer	Water bodies
Biology			
Aquatic flora	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or modification of habitats for aquatic plants?	Yes	East Ruston Stream North Walsham and Dilham Canal Bure (Scarrow Beck to Horstead Mill) Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	New Cut Mermaid Stream
Benthic invertebrates	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or modification of habitats for aquatic invertebrates?	Yes	East Ruston Stream North Walsham and Dilham Canal Bure (Scarrow Beck to Horstead Mill) Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	New Cut Mermaid Stream
Fish	Could the activity change the hydromorphology and/or physico-	Yes	East Ruston Stream North Walsham and Dilham Canal

Parameter	Scoping question	Answer	Water bodies
	chemistry of the water body, or lead to the direct loss or modification of shelter, feeding and spawning habitats for fish?		Bure (Scarrow Beck to Horstead Mill) Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	New Cut Mermaid Stream
Hydromorphology			
Hydrological regime	Could the activity change the volume, energy or distribution of flows in the water body?	Yes	East Ruston Stream North Walsham and Dilham Canal Bure (Scarrow Beck to Horstead Mill) Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	New Cut Mermaid Stream
Morphological conditions	Could the activity change the width, depth, bank conditions, bed substrates and structure of the riparian zone?	Yes	East Ruston Stream North Walsham and Dilham Canal Bure (Scarrow Beck to Horstead Mill) Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	New Cut Mermaid Stream
River continuity	Could the activity create a permanent barrier to the downstream movement of water and/or sediment, or the upstream movement of fish?	Yes	-
		No	East Ruston Stream North Walsham and Dilham Canal Bure (Scarrow Beck to Horstead Mill) Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
Physico-chemistry			
General	Could the activity change the temperature, pH, oxygenation, salinity or nutrient concentrations in the water body?	Yes	East Ruston Stream North Walsham and Dilham Canal Bure (Scarrow Beck to Horstead Mill) Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper

Parameter	Scoping question	Answer	Water bodies
		No	New Cut Mermaid Stream
Specific pollutants	Could the activity release dangerous chemicals into the water body?	Yes	East Ruston Stream North Walsham and Dilham Canal Bure (Scarrow Beck to Horstead Mill) Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	New Cut Mermaid Stream
Protected Areas			
Protected Areas	Is the activity within 2km of a protected area?	Yes	Wensum US Norwich
		No	East Ruston Stream North Walsham and Dilham Canal Bure (Scarrow Beck to Horstead Mill) Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
Improvement measures and mitigation measures			
Improvement measures (non-A/HMWBs) and mitigation measures (A/HMWBs)	Is the activity likely to impact on one of the improvement or mitigation measures in place?	Yes	-
		No	East Ruston Stream North Walsham and Dilham Canal Bure (Scarrow Beck to Horstead Mill) Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper New Cut Mermaid Stream
	Is the activity likely to prevent the delivery or effectiveness of one of the improvement or mitigation measures that is not yet in place?	Yes	-
		No	East Ruston Stream North Walsham and Dilham Canal Bure (Scarrow Beck to Horstead Mill) Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper New Cut Mermaid Stream

Table 20.9 Watercourse crossings: Scoping questions for groundwater bodies

Parameter	Scoping question	Answer	Water bodies
Groundwater quantity	Will the activity change groundwater levels affecting Groundwater Dependent Terrestrial Ecosystems (GWDTEs) or dependent surface water features?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activity lead to saline intrusion?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the level of proposed groundwater abstraction (dewatering) exceed recharge at a water body scale?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activity lead to an additional surface water body that will become non-compliant and lead to failure of the Dependent Surface Water test?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activity result in additional abstraction that will exceed any groundwater body scale headroom between the Fully licensed quantity and the limit imposed by the total recharge?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activity result in additional groundwater depletion of surface water flows that will exceed any groundwater body scale headroom between Fully Licensed depletion and the Limit imposed by the total low flows resource?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
Groundwater quality	Will the activities have the potential to result in or exacerbate widespread diffuse pollution at a water body scale?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activities have the potential to result in pollution of groundwater dependent terrestrial ecosystems (GWDTEs) or other dependent surface water features?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activity lead to saline intrusion?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activities have the potential to	Yes	-

Parameter	Scoping question	Answer	Water bodies
	cause deterioration in the quality of a drinking water abstraction?	No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activities have the potential to result in increasing trends in pollutant concentrations or reduce the ability of the water body being able to reverse significant trends in groundwater pollutants?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activities result in the failure of the 'prevent or limit' objective of the Groundwater Daughter Directive?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk

20.5.2.3 Installation of the export cable and landfall cable connection

97. There is potential for physico-chemical and biological impacts upon the Norfolk East coast water body as a result of the works associated with the connection of the cable at the landfall site. The mechanisms for impact comprise the potential to create a localised increase in suspended sediment concentration since works will be undertaken within the water under the long HDD technique.

98. The assessment of this potential impact, detailed in Annex 20.2.3 and Table 20.10, establishes that due to the nature of the seabed material (sand and gravelly sand), any impacts upon suspended sediment concentrations will be likely be short lived (not exceeding 14 days) and localised. As such, there are no mechanisms for impact upon the physico-chemistry and biology quality elements associated with coastal water body as a result of this activity. This activity will not, therefore, result in any deterioration in water body status and is scoped out of the assessment at this stage.

99. There is potential for physico-chemical and biological impacts upon the Norfolk East coast water body as a result of the works associated with the installation of the offshore export cable. The only mechanism for impact identified comprises the potential temporary resuspension of sediment as a result of ploughing and jetting activities, which may also result in a temporary disturbance of habitat during sediment resuspension.

100. The assessment of these potential impacts, detailed in Annex 20.2.3 and Table 20.10, established that as the activity will be short-lived; this potential impact will not last longer than several hours. As such, there are no mechanisms for impact upon the physico-chemistry elements associated with coastal water body as a result of this activity. However, the potential effects on biological parameters are scoped in to

Stage 3 of assessment since the potential footprints at risk are greater than the scoping parameters.

Table 20.10 Installation of the export cable and landfall cable connection

Parameter	Scoping question	Landfall	Installation of export cable
Biology			
Fish	Will the activity present a barrier to fish movement, risk or entrainment, risk to health and/or impact on a spawning area?	No	No
Fish	Will the activity impinge the movement of estuarine fish, or place them at risk of entrainment?	No	No
Phytoplankton	Will the activity change water temperature, salinity, transparency, microbial concentrations, dissolved oxygen concentrations and/or nutrient levels of the water body for greater than 14 days or in a water body •with a phytoplankton status of moderate, poor or bad?	No	No
	Is the activity in a water body with a history of significant and persistent algal blooms or toxic algal blooms?	No	No
Flora/fauna/angiosperms/ benthic invertebrates	Which type of habitat is likely to be impacted and what percentage of the habitat is impacted within the water body?	No	Yes. There is a possibility that the activity could impact on lower sensitivity habitats.
Hydromorphology			
Hydromorphology	Is the water body high status/is the water body heavily modified for the same reason/use as the proposed project?	No	No
	Will the activity have a significant impact on the hydromorphology of any other water body not at high status?	No	No
Physico-chemistry			
Chemistry	Is the activity potentially releasing dangerous chemicals from surfaces, sediments and/or outfalls into the water body?	No	No
	Is the activity taking place in an area with limited water exchange (with	No	No

Parameter	Scoping question	Landfall	Installation of export cable
	the potential to cause thermal changes or change dilution factors)?	No	No
Protection Areas			
Protected Areas	Is the activity within 2km of a protected area?	No	No. Sea Palling designated bathing water is located within 2km of the offshore cable corridor however, the potential effects on designated bathing waters in the ES concluded there are unlikely to be any significant effects on this bathing water.
Improvement measures and mitigation measures			
Improvement measures (non-A/HMWBs)	Is the activity likely to impact on one of the improvement measures in place?	No	No
	Is the activity likely to prevent the delivery or effectiveness of one of the improvement measures that is not yet in place?	No	No
Mitigation measures (A/HMWBs)	Is the activity likely to impact on one of the mitigation measures in place?	No	No
	Is the activity likely to prevent the delivery or effectiveness of one of the mitigation measures that is not yet in place?	No	No

20.5.3 Operation Impacts

20.5.3.1 Operation and maintenance of permanent infrastructure

101. Table 20.11 demonstrates that permanent presence of and continued maintenance of project infrastructure (including cable ducting and the onshore project substation) has the potential to impact upon the hydromorphology, physico-chemistry and biology of the water bodies in which these activities will take place.

102. With regards to hydromorphology, there is potential for impacts on the hydrological regime, morphological conditions and river continuity of the river water bodies as a result of:

- Alteration of surface water flows entering river water bodies as a result of changes in land use due to the permanent presence of onshore project substation infrastructure. This could impact upon the hydrology the surface water system; and
- Increased sediment supply to surface waters during operation via surface runoff of from the onshore project substation, which could impact upon the geomorphology of the river water bodies.

103. With regards to physico-chemistry, there is potential for impacts on the oxygenation conditions, salinity and acidification status of the river water bodies as a result of:

- Increased sediment supply to surface waters via surface runoff from operational sites, which could impact upon surface water quality.
- Supply of contaminants to surface waters through surface runoff or accidental spillage or leakage of fuel oils or lubricants from vehicles during operational activities (including maintenance), which could impact upon surface water quality.

104. With regards to biology, there is potential for impacts on quality elements such as aquatic flora, benthic invertebrate fauna and fish fauna in the river water bodies as a result of the potential changes to hydromorphology and physico-chemistry described above.

105. These activities have therefore been scoped into Stage 3 of the assessment for the following water bodies:

- East Ruston Stream;
- New Cut;
- North Walsham and Dilham Canal (disused);
- King's Beck;
- Bure (Scarrow Beck to Horstead Mill);
- Mermaid Stream;
- Wensum US Norwich;
- Blackwater Drain (Wensum);
- Wendling Beck; and
- Wissey – Upper.

106. Table 20.12 demonstrates that the operational infrastructure and associated maintenance activities do not have potential to impact upon the quantity or quality of groundwater. Although there is potential for the presence of the buried cable ducting throughout the cable route to impact upon the quantitative status of the groundwater bodies which underlie the project, the size of the cable ducting in comparison to the size of the groundwater bodies which underlie the project will

result in a negligible impact upon infiltration rates, groundwater flows, subsurface flow routes and alterations in the distribution of groundwater. Furthermore, there are no mechanisms for impact upon the quantitative quality elements of groundwater. The following water bodies have therefore been screened out of the assessment at this stage:

- Broadland Rivers Chalk & Crag;
- Cam and Ely Ouse Chalk; and
- North Norfolk Chalk.

Table 20.11 Project operation and maintenance: Scoping questions for river water bodies

Parameter	Scoping question	Answer	Water bodies
Biology			
Aquatic flora	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or modification of habitats for aquatic plants?	Yes	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	-
Benthic invertebrates	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or modification of habitats for aquatic invertebrates?	Yes	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	-
Fish	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or modification of shelter, feeding and spawning habitats for fish?	Yes	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper

Parameter	Scoping question	Answer	Water bodies
		No	-
Hydromorphology			
Hydrological regime	Could the activity change the volume, energy or distribution of flows in the water body?	Yes	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	-
Morphological conditions	Could the activity change the width, depth, bank conditions, bed substrates and structure of the riparian zone?	Yes	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	-
River continuity	Could the activity create a permanent barrier to the downstream movement of water and/or sediment, or the upstream movement of fish?	Yes	-
		No	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
Physico-chemistry			
General	Could the activity change the temperature, pH, oxygenation, salinity or nutrient concentrations in the water body?	Yes	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck

Parameter	Scoping question	Answer	Water bodies
			Wissey – Upper
		No	-
Specific pollutants	Could the activity release dangerous chemicals into the water body?	Yes	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
		No	-
Protected Areas			
Protected Areas	Is the activity within 2km of a protected area?	Yes	Wensum US Norwich
		No	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
Improvement measures and mitigation measures			
Improvement measures (non-A/HMWBs) and mitigation measures (A/HMWBs)	Is the activity likely to impact on one of the improvement or mitigation measures in place?	Yes	-
		No	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich Blackwater Drain (Wensum) Wendling Beck Wissey – Upper
	Is the activity likely to prevent the delivery or effectiveness of one of the improvement or mitigation measures that is not yet in place?	Yes	-
		No	East Ruston Stream New Cut North Walsham and Dilham Canal King's Beck Bure (Scarrow Beck to Horstead Mill) Mermaid Stream Wensum US Norwich

Parameter	Scoping question	Answer	Water bodies
			Blackwater Drain (Wensum) Wendling Beck Wissey – Upper

Table 20.12 Project operation and maintenance: Scoping questions for groundwater bodies

Parameter	Scoping question	Answer	Water bodies
Groundwater quantity	Will the activity change groundwater levels affecting Groundwater Dependent Terrestrial Ecosystems (GWDTEs) or dependent surface water features?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activity lead to saline intrusion?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the level of proposed groundwater abstraction (dewatering) exceed recharge at a water body scale?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activity lead to an additional surface water body that will become non-compliant and lead to failure of the Dependent Surface Water test?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activity result in additional abstraction that will exceed any groundwater body scale headroom between the Fully licensed quantity and the limit imposed by the total recharge?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activity result in additional groundwater depletion of surface water flows that will exceed any groundwater body scale headroom between Fully Licensed depletion and the Limit imposed by the total low flows resource?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
Groundwater quality	Will the activities have the potential to result in or exacerbate widespread diffuse pollution at a water body scale?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activities have the potential to result in pollution of groundwater dependent terrestrial ecosystems (GWDTEs) or other dependent surface	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk

Parameter	Scoping question	Answer	Water bodies
	water features?		
	Will the activity lead to saline intrusion?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activities have the potential to cause deterioration in the quality of a drinking water abstraction?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activities have the potential to result in increasing trends in pollutant concentrations or reduce the ability of the water body being able to reverse significant trends in groundwater pollutants?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Will the activities result in the failure of the 'prevent or limit' objective of the Groundwater Daughter Directive?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk

20.5.3.2 Presence of offshore cable protection

107. There is potential for impacts upon the Norfolk East water body associated with presence of the offshore cable protection.

108. The assessment of these potential impacts, described in detailed in Annex 20.2.3 and Table 20.13, demonstrates that due to the small extent of cable protection within the water body, there is no potential for impacts on hydromorphology, biology, fish, water quality, WFD protected areas, or invasive non-native species.

109. As such, there are no mechanisms for impact upon the coastal water body as a result of this activity. This activity will not, therefore, result in any deterioration in water body status and is scoped out of the assessment at this stage.

Table 20.13 Presence of offshore cable protection

Parameter	Scoping question	Answer	Notes
Biology			
Fish	Will the activity impinge the movement of estuarine fish, or place them at risk of entrainment?	No	No further action
Phytoplankton	Is the activity in a water body with a history of significant and persistent algal blooms or toxic algal blooms?	No	No further action

Parameter	Scoping question	Answer	Notes
Flora/fauna/angiosperms/benthic invertebrates	Which type of habitat is likely to be impacted and what percentage of the habitat is impacted within the water body?	Percentage habitat impacted very small	No further action
Hydromorphology			
Hydromorphology	Is the water body high status/is the water body heavily modified for the same reason/use as the proposed project?	No	No further action.
Physico-chemistry			
Chemistry	Is the activity potentially releasing dangerous chemicals from surfaces, sediments and/or outfalls into the water body?	No	No further action.
	Is the activity taking place in an area with limited water exchange (with the potential to cause thermal changes or change dilution factors)?	No	No further action.
Protection Areas			
Protected Areas	Is the activity within 2km of a protected area	No	No further action.
Improvement measures and mitigation measures			
Improvement measures (non-A/HMWBs)	Is the activity likely to impact on one of the improvement measures in place?	No	No further action.
	Is the activity likely to prevent the delivery or effectiveness of one of the improvement measures that is not yet in place?	No	No further action.
Mitigation measures (A/HMWBs)	Is the activity likely to impact on one of the mitigation measures in place?	No	No further action
	Is the activity likely to prevent the delivery or effectiveness of one of the mitigation measures that is not yet in place?	No	No further action

20.5.4 Summary of Stage 2

110. The Stage 2 scoping assessment has established that following activities have the potential to cause deterioration in water body status:

- Initial site preparation, earthworks and works associated with all onshore developments (i.e. onshore project substation, landfall and cable installation), including the stockpiling of materials and installation works;
- Installation of watercourse crossings;

- Installation of offshore export cable; and
- Operation and maintenance of permanent onshore infrastructure.

111. The potential impacts of these activities have therefore been carried forward to the Stage 3 Detailed Compliance Assessment. All other construction stage and operational impacts have been excluded from the assessment at this stage.

112. It should be noted that because potential impacts on the River Wensum SAC will be considered in detail in the separate shadow Habitats Regulations Assessment, impacts on this protected area will not be considered explicitly as part of the WFD compliance assessment process. Additionally, the biological quality element assessment for the coastal water body builds in a consideration of critical habitats likely to contribute to the European designation but on a water body spatial scale. No further consideration of these sites is therefore included within this WFD compliance assessment.

20.6 Stage 3: Detailed Compliance Assessment

20.6.1 Purpose of this Section

113. This section presents the results of the detailed compliance assessment undertaken on the water bodies identified in section 20.5.4 of this report, using the method outlined in section 20.3.4.

114. This assessment determines whether the activities and/or project components that have been put forward from the Stage 2 scoping assessment will cause deterioration and whether this deterioration will have a significant non-temporary effect on the status of one or more WFD quality elements at water body level.

20.6.2 Control Measures

115. In a WFD context, the term ‘mitigation measures’ is used specifically to refer to measures identified by the Environment Agency in the RBMPs to address pressures in A/HMWBs. The term “control measures” is therefore used in this assessment to refer to additional measures used to mitigate the impacts of the project. These control measures are analogous to the ‘mitigation measures’ referred to in the ES.

116. Norfolk Vanguard Limited has committed to a number of techniques and engineering designs/modifications inherent as part of the project, during the pre-application phase, in order to avoid a number of impacts or reduce impacts as far as possible. Embedding mitigation into the project design is a type of primary mitigation and is an inherent aspect of the EIA process.

117. A range of different information sources has been considered as part of embedding mitigation into the design of the project (for further details see ES Chapter 5 Project Description, ES Chapter 4 Site Selection and Assessment of Alternatives and the Consultation Report) including engineering preference, feedback from community and landowners, ongoing discussions with stakeholders and regulators, commercial considerations and environmental best practice.

118. The activities for assessment for the project comprise a wide variety of different components during the construction and operation phases. It is important to acknowledge that the potential impacts of the project on water bodies would be minimised by the inclusion of in-built mitigation measures within the project design. These measures are detailed in Table 20.14. Where embedded mitigation measures have been developed into the design of the project with specific regard to water resource and flood risk these are described in Table 20.15.

Table 20.14 Embedded control measures

Parameter	Mitigation measures embedded into the project design	Notes
Strategic approach to delivering Norfolk Vanguard and Norfolk Boreas	Subject to both Norfolk Vanguard and Norfolk Boreas receiving development consent and progressing to construction, onshore ducts will be installed for both projects at the same time, as part of the Norfolk Vanguard construction works. This would allow the main civil works for the cable route to be completed in one construction period and in advance of cable delivery, preventing the requirement to reopen the land in order to minimise disruption. Onshore cables would then be pulled through the pre-installed ducts in a phased approach at later stages. In accordance with the Horlock Rules, the co-location of Norfolk Vanguard and Norfolk Boreas onshore project substations will keep these developments contained within a localised area and, in so doing, will contain the extent of potential impacts.	The strategic approach to delivering Norfolk Vanguard and Norfolk Boreas has been a consideration from the outset.
Commitment to HVDC technology	Commitment to HVDC technology minimises environmental impacts through the following design considerations; • HVDC requires fewer cables than the HVAC solution. During the duct installation phase this reduces the cable route working width (for Norfolk Vanguard and Norfolk Boreas combined) to 45m from the previously identified worst case of 100m. As a result, the overall footprint of the onshore cable route required for the duct installation phase is reduced from approx. 600ha to 270ha; • The width of permanent cable easement is also reduced from 54m to 20m;	Norfolk Vanguard Limited has reviewed consultation received and in light of the feedback, has made a number of decisions in relation to the project design. One of these decisions is to deploy HVDC technology as the export system.

Parameter	Mitigation measures embedded into the project design	Notes
	• Removes the requirement for a CRS; • Reduces the maximum duration of the cable pull phase from three years down to two years; • Reduces the total number of jointing bays for Norfolk Vanguard from 450 to 150; and • Reduces the number of drills needed at trenchless crossings (including landfall).	
Site Selection	The project has undergone an extensive site selection process which has involved incorporating environmental considerations in collaboration with the engineering design requirements. Considerations include (but are not limited to) adhering to the Horlock Rules for onshore project substations and National Grid infrastructure, a preference for the shortest route length (where practical) and developing construction methodologies to minimise potential impacts. Key design principles from the outset were followed (wherever practical) and further refined during the EIA process, including; • Avoiding proximity to residential dwellings; • Avoiding proximity to historic buildings; • Avoiding designated sites; • Minimising impacts to local residents in relation to access to services and road usage, including footpath closures; • Utilising open agricultural land, therefore reducing road carriageway works; • Minimising requirement for complex crossing arrangements, e.g. road, river and rail crossings; • Avoiding areas of important habitat, trees, ponds and agricultural ditches; • Installing cables in flat terrain maintaining a straight route where possible for ease of pulling cables through ducts; • Avoiding other services (e.g. gas pipelines) but aiming to cross at close to right angles where crossings are required; • Minimising the number of hedgerow crossings, utilising existing gaps in field boundaries; • Avoiding rendering parcels of agricultural land inaccessible; and • Utilising and upgrading existing accesses where possible to avoid impacting undisturbed ground.	Constraints mapping and sensitive site selection to avoid a number of impacts, or to reduce impacts as far as possible, is a type of primary mitigation and is an inherent aspect of the EIA process. Norfolk Vanguard Limited has reviewed consultation received to inform the site selection process (including local communities, landowners and regulators) and in response to feedback, has made a number of decisions in relation to the siting of project infrastructure. The site selection process is set out in Chapter 4 Site Selection and Assessment of Alternatives.
Duct Installation Strategy	The onshore cable duct installation strategy is proposed to be conducted in a sectionalised approach in order to minimise impacts. Construction teams	This has been a project commitment from the outset in response to lessons learnt on other

Parameter	Mitigation measures embedded into the project design	Notes
	would work on a short length (approximately 150m section) and once the cable ducts have been installed, the section would be back filled and the top soil replaced before moving onto the next section. This would minimise the amount of land being worked on at any one time and would also minimise the duration of works on any given section of the route.	similar NSIPs. Chapter 5 Project Description provides a detailed description of the process.
Long HDD at landfall	Use of long HDD at landfall to avoid restrictions or closures to Happisburgh beach and retain open access to the beach during construction. Norfolk Vanguard Limited have also agreed to not use the beach car park at Happisburgh South.	Norfolk Vanguard Limited has reviewed consultation received and in response to feedback, has made a number of decisions in relation to the project design. One of those decisions is to use long HDD at landfall.
Trenchless Crossings	Commitment to trenchless crossing techniques to minimise impacts to the following specific features; • Wendling Carr County Wildlife Site; • Little Wood County Wildlife Site; • Land South of Dillington Carr County Wildlife Site; • Kerdiston proposed County Wildlife Site; • Marriott's Way County Wildlife Site / Public Right of Way (PRoW); • Paston Way and Knapton Cutting County Wildlife Site; • Norfolk Coast Path; • Witton Hall Plantation along Old Hall Road; • King's Beck; • River Wensum; • River Bure; • Wendling Beck; • Wendling Carr; • North Walsham and Dilham Canal; • Network Rail line at North Walsham that runs from Norwich to Cromer; • Mid-Norfolk Railway line at Dereham that runs from Wymondham to North Elmham; and • Trunk Roads including A47, A140, A149.	A commitment to a number of trenchless crossings at certain sensitive locations was identified at the outset. However, Norfolk Vanguard Limited has committed to certain additional trenchless crossings as a direct response to stakeholder requests.

Table 20.15 Embedded mitigation for water reousrces and flood risk

Parameter	Mitigation measures embedded into the project design	Notes
Sediment management	The area of open ground at any one time within one sub-catchment will be restricted to a maximum of 2 working areas	n/a

Parameter	Mitigation measures embedded into the project design	Notes
	(configured as 45m x 300m strips), one mobilisation area, one set of trenchless crossing compounds and 5km running track per 5km of cable. Topsoil would be stripped from the entire width of the onshore cable route for the length of the workfront (150m), and stored and capped to minimise wind and water erosion. Once all the trenching is completed and back-filled, the stored topsoil will be re-distributed over the area of the workfront, with the exception of the running track and any associated drainage. Mobilisation areas within the onshore project area will comprise hardstanding of permeable gravel aggregate underlain by geotextile, or other suitable material.	
Watercourse crossings	Trenchless crossing techniques will be employed at the following major watercourses: River Wensum, River Bure, King's Beck, Wendling Beck (two crossing points), and the North Walsham and Dilham Canal. Stop ends would be employed on the running track at each of the trenchless crossing points outlined above, with the exception of the crossing of Wendling Beck at Bushy Common. Reinstatement of the channel would achieve the pre-construction depth of the watercourse, and the dams removed. The width of the running track at watercourse crossings will be minimised from 6m to 3m to limit the area of direct disturbance.	n/a
Surface drainage	Changes in surface water runoff as a result of the increase in impermeable area from the substation will be attenuated and discharged at a controlled rate, in consultation with the LLFA and Environment Agency. The controlled runoff rate will be equivalent to the greenfield runoff rate. An attenuation pond with a volume of 4,050m^3 (approximate dimensions of 58m x 58m x 1.2m) has been allowed for at the onshore project substation to provide sufficient attenuation to greenfield runoff rates into the closest watercourse or sewer connection. The full specification for the attenuation pond will be addressed as part of detailed design. Allowance for increased attenuation of surface water drainage (an extension to the existing pond or a new pond in proximity to the existing pond) at the Necton National Grid substation has also been included to accommodate additional impermeable ground associated with the National Grid substation extension for Norfolk Vanguard. During construction, the onshore cable route will be bounded by drainage channels (one on each side) to intercept drainage from within the working corridor. Additional drainage channels will be installed to intercept water from the cable trench.	n/a

Parameter	Mitigation measures embedded into the project design	Notes
	Depending upon the precise location, water from the channels will be infiltrated or discharged into the surface drainage network.	
Foul drainage	During the construction phase, foul drainage at the onshore project substation and mobilisation areas will be collected through a mains connection to existing local authority sewer system (if available) or septic tanks located within the development boundary. Foul drainage from welfare facilities along the cable route will be collected in septic tanks and taken off site for disposal at a licensed site. During operation, foul drainage at the onshore project substation will be collected through a mains connection to the existing local authority sewer system (if a suitable connection is available) or collected in a septic tank located within the development boundary and transported off site for disposal at a licensed facility.	n/a

119. The assessment presented in section 20.3 of this report assumes that these control measures are in place.

20.6.3 Initial Site Preparation, Earthworks and Works Associated with the Onshore Development

20.6.3.1 Description of Potential Impacts on Water Body Status

120. Onshore construction activities, including initial site preparation, earthworks and works associated with all onshore developments (i.e. onshore project substation, landfall and cable installation), including the stockpiling of materials and installation works have the potential to impact upon the hydromorphology, physico-chemistry and biology of the following water bodies:

- East Ruston Stream;
- New Cut;
- North Walsham and Dilham Canal (disused);
- King's Beck;
- Bure (Scarrow Beck to Horstead Mill);
- Mermaid Stream;
- Wensum US Norwich;
- Blackwater Drain (Wensum);
- Wissey – Upper; and
- Wendling Beck.

121. With regards to hydromorphology, there is potential for impacts on the hydrological regime and morphological conditions of the river water bodies as a result of:

- Alteration of surface water flows entering river water bodies as a result of changes in land use during the construction of the landfall and onshore project substation. This could impact upon the hydrology of the surface water system.
- Increased sediment supply to surface waters through erosion of exposed soils along the cable corridor and within the landfall and onshore project substation sites by surface runoff, which could impact upon the hydromorphology of the river water bodies.

122. With regards to physico-chemistry, there is potential for impacts on the oxygenation conditions, salinity and acidification status of the river water bodies as a result of:

- Increased sediment supply to surface waters through erosion of exposed soils by surface runoff, which could impact upon surface water quality.
- Supply of contaminants to surface waters through surface runoff or accidental spillage during excavation of contaminated soils, or accidental spillage or leakage of fuel oils or lubricants from construction vehicles, which could impact upon surface water quality.

123. With regards to biology, there is potential for impacts on aquatic flora, benthic invertebrate fauna and fish fauna in the river water bodies as a result of the potential changes to hydromorphology and physico-chemistry described above. However, the proposed control measures that will be in place to reduce the potential for impacts on these quality elements will also prevent impacts to the biological quality elements.

124. The scale of the potential impact upon a water body is likely to be proportional to the area of each water body catchment that would be disturbed during construction. The maximum total area that could potentially be disturbed in each water body during the entire 2-year construction period is summarised in Table 20.16. However, it is important to note that the active working area at any one time will be restricted in spatial extent (0.014km^2) and duration (2 weeks). The worst case assumption is that, in a given 5km stretch of cable route, work at any one time will be restricted to a maximum of two workfronts (0.028km^2), one mobilisation area, one set of trenchless crossings and 5km of running track. These areas have been scaled according to the length of cable route in each water body, and the results are shown in Table 20.16. Note that, where a sub-catchment contains less than 5km cable route, it is assumed that two workfronts, one mobilisation area and one set of trenchless crossings would still be worked on concurrently as a worst case (i.e. these elements have a fixed area and cannot be sub-divided).

Table 20.16 Area of disturbed ground in surface water catchments

Water body	Maximum total area of disturbed ground		Maximum working area at any one time	
	km^2	%	km^2	%
New Cut	0.19	0.93	0.08	0.24
East Ruston Stream	0.32	1.26	0.07	0.32
North Walsham & Dilham Canal	0.42	0.78	0.05	0.12
King's Beck	0.37	0.52	0.08	0.11
Bure (Scarrow Beck to Horstead Mill)	0.39	1.03	0.08	0.22
Mermaid Stream	0.12	0.57	0.05	0.23
Blackwater Drain (Wensum)	0.71	1.09	0.16	0.24
Wensum US Norwich	0.47	0.25	0.10	0.05
Wendling Beck	0.87	1.10	0.17	0.22
Wissey - Upper	0.77	0.87	0.06	0.06

20.6.3.2 Control Measures

125. In addition to the embedded control measures set out in section 20.6.2, the potential for impacts associated with increased supply of sediment and other contaminants will be reduced by a range of additional control measures, as set out below.

126. A Construction Method Statement (CMS) will be developed and will follow construction industry good practice guidance as detailed in the Environment Agency's Pollution Prevention Guidance (PPG) notes (including PPG01, PPG05, PPG08 and PPG21) (now revoked as regulatory guidance in England, but still provides a useful guide for best practice measures), and CIRIA's 'Control of water pollution from construction sites – A guide to good practice' (2001). Specific measures to control sediment supply include:

- Subsoil exposure will be minimised and strips of undisturbed vegetation will be retained on the edge of the working area where possible;
- On-site retention of sediment will be maximised by routing all drainage through the site drainage system;
- The drainage system will include silt fences at the foot of soil storage areas to intercept sediment runoff at source. Where practicable, runoff will be routed into swales, which incorporate check dams to further intercept sediment and/or attenuation ponds which incorporate sediment forebays. Suitable filters will be used to remove sediment from any water discharged into the surface drainage network;
- Additional silt fences will be included in parts of the working area that are in close proximity to surface drainage channels; and

- Soil and sediment will not be allowed to accumulate on roads. Traffic movement would be restricted to minimise the potential for surface disturbance.

127. Buffer strips will be retained adjacent to watercourses where possible. Where surface vegetation has been removed, it will be reseeded to prevent future runoff (excluding arable crops).

128. A Surface Water and Drainage Plan (SWDP) will also be developed and implemented to minimise water within the cable trench and ensure ongoing drainage of surrounding land. Where water enters the trenches during installation, this will be pumped via settling tanks, sediment basins or mobile treatment facilities to remove sediment, before being discharged into local ditches or drains via temporary interceptor drains in order to prevent increases in fine sediment supply to the watercourses.

129. In addition to the sediment management measures set out above, additional measures to prevent contamination will include the following:

- Concrete and cement mixing and washing areas will be situated at least 10m away from the nearest watercourse. These will incorporate settlement and recirculation systems to allow water to be re-used. All washing out of equipment will be undertaken in a contained area, and all water will be collected for off-site disposal;
- All fuels, oils, lubricants and other chemicals will be stored in an impermeable bund with at least 110% of the stored capacity. Damaged containers will be removed from site. All refuelling will take place in a dedicated impermeable area, using a bunded bowser. Biodegradable oils will be used where possible; and
- Spill kits will be available on site at all times. Sand bags or stop logs will also be available for deployment on the outlets from the site drainage system in case of emergency spillages.

20.6.3.3 Summary of Impacts on Water Body Status

Following application of the embedded and additional control measures described above, there will be no direct mechanisms for impact upon the hydromorphology, physico-chemistry and biology of any river water bodies as a result of the onshore construction activities. This means that these construction stage activities will not result in deterioration in the status of any river water bodies or prevent WFD objectives being achieved in these water bodies in the future.

20.6.4 Installation of Watercourse Crossings

20.6.4.1 Description of Potential Imapcts on Water Body Status

130. The onshore cable route will need to cross a number of surface water body catchments, and therefore has the potential to impact upon the hydromorphology, physico-chemistry and biology quality elements within the following water bodies as a result of this activity:

- East Ruston Stream;
- North Walsham and Dilham Canal (disused);
- Bure (Scarrow Beck to Horstead Mill);
- Wensum US Norwich;
- Blackwater Drain (Wensum);
- Wendling Beck; and
- Wissey – Upper.

131. A summary of the crossing techniques proposed for use in each water body is provided in Table 20.17.

Table 20.17 Watercourse crossing techniques in each water body

Water body	Number of crossings within water body catchment		
	Open cut	Trenchless	Total
East Ruston Stream	2	0	2
North Walsham and Dilham Canal (disused)	2	4	6
King's Beck	4	5	9
Bure (Scarrow Beck to Horstead Mill)	5	2	7
Blackwater Drain (Wensum)	10	1	11
Wensum US Norwich	5	5	10
Wendling Beck	5	3	8
Wissey – Upper	4	0	4

132. Trenchless crossing techniques (e.g. HDD) have been embedded within the scheme design to avoid impacts on the larger and most sensitive watercourses, including the main channels of the River Wensum, River Bure, King's Beck, Wendling Beck (two crossings) and the North Walsham and Dilham Canal. The cable will be installed at least 2m beneath the watercourse using a technique such as HDD, micro-tunnelling or auger boring (ES Chapter 5 Project Description). Although these techniques will cause some surface disturbance at the entry and exit points, there will be no direct disturbance of the surface watercourses. The running track will not cross any of the

watercourses that will be crossed by trenchless techniques, with the exception of Wendling Beck at Bushy Common. Inert drilling fluids will be used alongside other good practice measures to prevent contamination from construction equipment (see section 20.6.2 and 20.6.3 for further details).

133. There are therefore no direct mechanisms to impact upon the hydromorphology, physico-chemistry and biology of surface water bodies associated with trenchless techniques.

134. Although trenchless crossing techniques will be used for the larger and most sensitive watercourse crossings, open cut trenched techniques will be used for the majority of watercourse crossings, including the main channel of the Blackwater Drain and the smaller drainage channels which drain into each main-stem water body. Two potential open cut trenched crossing techniques have been identified, depending upon the dimensions of the watercourse:

- Temporary dam and divert: For watercourses that are shallower than 1.5m, temporary dams (composed of either sand bags or straw bales and ditching clay) will be installed upstream and downstream of the cable crossing to allow works to be undertaken in dry conditions. A pump, temporary flume or bypass channel will be used to maintain flows downstream of the dams. Temporary culverts or bridges (with a width of up to 3m) may be required to allow the running track to cross the watercourse at these trenched crossing locations. Depending upon the location, it may be necessary for these to remain in place for up to 2 years during the duct installation works, with the potential for a further period during cable pulling; and
- Permanent culvert: For watercourses that are 1.5m or deeper, it may be possible to use the approach outlined above, however in some cases it may be necessary to install a pipe or box culvert.

135. In addition, temporary culverts will be required to allow the running track to cross surface watercourses. These will be used at the majority of crossing locations, including Wendling Beck at Bushy Common but excluding all other watercourses crossed using trenchless techniques.

136. With regards to hydromorphology, there is potential for watercourse crossings to impact upon on the hydrological regime, morphological conditions and river continuity of the river water bodies as a result of:

- Alterations to the hydromorphology of the watercourse through localised disruption to the bed and banks, as a result of open trench cutting.

- Reduction in flow and sediment conveyance (particularly coarse sediment), creation of upstream impoundment, and encouragement of fine sedimentation as a result of temporary dams and culverts installed during trenching or along the running track.
- Alteration of surface water flows as a result of impoundment by temporary dams or culverts during the works in the water bodies. This could impact upon the hydrology of the surface water system, change patterns of erosion and sedimentation, and impede river continuity.

137. With regards to physico-chemistry, there is potential for impacts on the oxygenation conditions, salinity and acidification status of the river water bodies as a result of the supply of contaminants to surface waters through surface runoff or accidental spillage during excavation of contaminated soils, or accidental spillage or leakage of fuel oils or lubricants from construction vehicles, which could impact upon surface water quality.

138. With regards to biology, there is potential for impacts on quality elements such as aquatic flora, benthic invertebrate fauna and fish fauna in the river water bodies as a result of the potential reduction in river continuity resulting from the installation of temporary dams and culverts (e.g. preventing upstream and downstream movement of biota) and the potential changes to hydromorphology and physico-chemistry described above.

20.6.4.2 Control Measures

139. In addition to the embedded control measures described in section 20.6.2, the following additional measures would be applied to reduce the impacts associated with watercourse crossings:

- The specifc dam and divert method for larger watercourses will be agreed at detailed design with internal drainage boards and flood management agencies, as part of the relevant secondary consent processes;
- In order to ensure that there are no adverse impacts resulting from the installation of temporary dams, the following measures would be employed:
    - Restricting the amount of time that temporary dams are in place, e.g. typically no more than one week;
    - Fish rescue should be undertaken in the area between the temporary dams prior to dewatering;
    - Ensuring that any pumps, flumes (pipes) or diversion channels are appropriately sized to maintain flows downstream of the obstruction whilst minimising upstream impoundment;

  - Where appropriate, selecting a technique that can allow fish passage to be maintained in watercourses which support migratory fish species such as brown trout; and
  - Where diversion channels are used, geotextiles or similar techniques will be used to line the channel and prevent sediment entering the watercourse.

- Potential impacts resulting from the use of culverts at watercourse crossings would be mitigated through:
  - Ensuring that the culvert is adequately sized to avoid impounding flows (including an allowance for potential increases in winter flows as a result of projected climate change); and
  - Installing the culvert below the active bed of the channel, so that sediment continuity and movement of fish and aquatic invertebrates can be maintained.
- In addition to the general measures to mitigate the impacts of culverts noted above, in the case of temporary culverts for the running track, alternative techniques such as temporary bridges will be considered where appropriate (e.g. where culvert installation is likely to have an adverse impact on the hydromorphological and biological quality elements of a water body);
- Cable ducts would typically be installed 2m below the bed of the watercourse, allowing the necessary water volumes and flows (sufficient to account for climate-related changes in fluvial flows and erosion). This would be dependent upon local geology and associated risks, and other associated risks, to prevent geomorphological impacts (e.g. bed scour and channel instability) and avoid exposure during periods of higher energy flow where the bed could be mobilised; and
- Where possible, localised improvements to the geomorphology and in-channel habitats supported by watercourses that would be crossed using open cut techniques, through the sympathetic reinstatement of banks (e.g. by replacing resectioned banks with more natural profiles that are typical of the natural geomorphology of the watercourse) will be considered. Note that any improvements would be restricted to within the working area of the project.

20.6.4.3 Summary of Impacts on Water Body Status

140. Following application of the embedded and additional control measures described above, there will be no adverse impacts upon the hydromorphology, physico-chemistry and biology of any river water bodies as a result of the installation of watercourse crossings. This means that these construction stage activities will not

result in deterioration in the status of any river water bodies or prevent WFD objectives being achieved in these water bodies in the future.

20.6.5 Installation of Offshore Export Cable

20.6.5.1 Description of Potential Impacts on Water Body Status

141. The potential impacts on marine ecology features associated with the cable installation are considered in detail in ES Chapter 10 Benthic and Intertidal Ecology. Mapping undertaken to inform the ES chapter does not indicate the presence of higher sensitivity habitats within 500m of the activity (even the likely sediment plume extent - the nearest potential area supporting Sabellaria is located several kilometres offshore), therefore this section focusses on the potential for effects to lower sensitivity habitats identified within the WFD water body.

142. The two habitats potentially at risk are shown in Annex 20.2.3 and are as follows:

- Outcrop which is considered to be closest to rocky reef; and
- Biotope SS.SMx.CMx Circalittoral mixed sediment which is considered to be closest to cobbles, gravel and shingle.

143. The sensitivity assessment for this habitat to physical disturbance is shown in Table 20.18.

Table 20.18 Biotope sensitivities to physical disturbance (source: Tyler-Walters, Lear and Allen, 2004; Tillin, 2016)

Biotope code	Biotope description	Tolerance	Recoverability	Overall sensitivity
SS.SMx.CMx	Circalittoral mixed sediment	Intermediate	Medium	Medium

144. The biotope circalittoral mixed sediment is considered to be ubiquitous in the local area. This is supported by the information available for the WFD water body which indicates that there is 12971.88 hectares (129.72 km^2) of this habitat present in this water body. Additionally, disturbance will be temporary (both in terms of clearance and any associated sediment plume) and habitats will recover following cessation of the works. As a result, a magnitude of low is allocated in ES Chapter 10 Benthic and Intertidal Ecology with a sensitivity of medium (as shown for the habitat outlined in Table 20.18) above which results in a temporary impact of minor adverse significance. This indicates a short term deterioration which is unlikely to be significant enough to cause a permanent deterioration within or between classes for biology compliance parameters.

145. The rocky outcrop is more difficult to allocate a lower sensitivity habitat biotope listed within the Environment Agency's guidance but given the very small area it is

unlikely to contribute to biological habitat diversity on a water body scale. Again, deterioration in lower sensitivity habitats is not therefore predicted.

20.6.5.2 Summary of Impacts on Water Body Status

146. The previous section demonstrates that installation of the offshore export cable will not result in deterioration in the status of any river water bodies or prevent WFD objectives being achieved in these water bodies in the future.

20.6.6 Operation and Maintenance of Permanent Onshore Infrastructure

20.6.6.1 Description of Potential Impacts on Water Body Status

147. There is potential for impacts upon hydromorphology, physico-chemistry and biology quality elements within the following water bodies as a result of the permanent presence of cable ducting and the onshore project substation:

- East Ruston Stream;
- North Walsham and Dilham Canal (disused);
- King's Beck;
- Bure (Scarrow Beck to Horstead Mill);
- Mermaid Stream;
- Wensum US Norwich;
- Blackwater Drain (Wensum);
- Wissey – Upper; and
- Wendling Beck.

148. With regards to hydromorphology, there is potential for impacts on the hydrological regime, morphological conditions and river continuity of the river water bodies as a result of:

- Alteration of surface water flows entering surface waters as a result of changes in land use following the construction of the landfall and onshore project substation infrastructure. This could impact upon the hydrology the surface water system; and
- Increased sediment supply to surface waters during operation via surface runoff of the sites, which could impact upon the geomorphology of the river water bodies.

149. With regards to physico-chemistry, there is potential for impacts on the oxygenation conditions, salinity and acidification status of the river water bodies as a result of:

- Increased sediment supply to surface waters via surface runoff from operational sites, which could impact upon surface water quality.

- Supply of contaminants to surface waters through surface runoff or accidental spillage or leakage of fuel oils or lubricants from vehicles during operational activities, which could impact upon surface water quality.

150. With regards to biology, there is potential for impacts on quality elements such as aquatic flora, benthic invertebrate fauna and fish fauna in the river water bodies as a result of the potential changes to hydromorphology and physico-chemistry described above. However, the embedded operational mitigation measures that will be in place to prevent any impacts on these quality elements will also prevent impacts on the biological quality elements.

151. There is potential for the presence of the buried cable ducting throughout the cable route to impact upon the quantitative status of the Broadland Rivers Chalk & Crag, Cam and Ely Ouse Chalk, and North Norfolk Chalk groundwater bodies which underlie the project. This impact may arise via the cable ducting disrupting natural infiltration patterns of surface water and groundwater flow patterns, therefore impacting upon the quantitative status of groundwater. However, the size of the cable ducting in comparison to the size of the groundwater bodies which underlie the project will result in a negligible impact upon infiltration rates, groundwater flows, subsurface flow routes and alterations in the distribution of groundwater.

152. There are no mechanisms for impact upon the quantitative quality elements associated with groundwater bodies as a result of this activity. This activity will not, therefore, result in any deterioration in water body status, and is scoped out of the assessment at this stage.

20.6.6.2 Control Measures

153. In addition to the embedded control measures set out in section 20.6.2, the potential for impacts associated with changes to surface flows and increased supply of sediment and other contaminants during operation will be reduced by a range of additional control measures, as set out below:

154. Surface water drainage requirements for operational onshore project infrastructure will be dictated by the final SWDP and will be designed to meet the requirements of the National Planning Policy Framework (NPPF) and NPS EN-5, with runoff limited, where feasible, through the use of infiltration techniques which can be accommodated within the area of development. The drainage strategy will be developed according to the principles of the SuDS discharge hierarchy. Generally, the aim will be to discharge surface water runoff as high up the following hierarchy of drainage options as reasonably practicable: i) into the ground (infiltration); ii) to a surface water body; iii) to a surface water sewer, highway drain or another drainage system; or iv) to a combined sewer.

20.6.6.3 Summary of Impacts on Water Body Status

155. Following application of the embedded and additional control measures described above, there will be no direct mechanisms for impact upon the hydromorphology, physico-chemistry and biology of any river water bodies as a result of the installation of watercourse crossings. This means that these construction stage activities will not result in deterioration in the status of any river water bodies or prevent WFD objectives being achieved in these water bodies in the future.

20.6.7 Cumulative Impacts

20.6.7.1 River Water Bodies

156. Sections 20.6.3 and 20.6.4 have demonstrated that the construction of the onshore project elements and watercourse crossings will take place concurrently in the river water bodies along the onshore cable route. These could potentially result in cumulative impacts in the water bodies concerned.

157. However, these sections have also demonstrated that any potential impacts will be fully mitigated by control measures embedded within the project design or recommended to prevent further impact. These activities will not therefore result in deterioration in water body status or prevent status objectives being achieved in the future. This means that there will be no mechanism for cumulative impacts to occur in the river water bodies scoped in to the assessment.

20.6.7.2 Norfolk East Coastal Water Body

158. In terms of potential cumulative impacts within this WFD water body, these are limited given the time over which the activities will occur and spatial extent of the individual activities considered within this assessment. During construction for example, the activities landfall and cable installation could combine to increase the size of any sediment plume however the sediment disturbed during the cable installation is likely to be significantly greater than that created by the landfall activities. Therefore the likely cumulative impacts are predicted to be of a similar scale as those predicted for cable installation alone.

159. Cumulative impacts between the construction and the operational period could only arise as a result of habitat disturbance and therefore temporary habitat loss associated with the installation of cables and habitat loss associated with the presence of cable protection. However, given that the habitat disturbed by cable installation will recover relatively quickly and therefore a permanent loss will not occur, the loss will not combine with the habitat loss associated with cable protection. As a result, the cumulative effect is predicted to be the same as that for the presence of cable protection alone.

20.7 Stage 4: Summary of Assessment and Mitigation Requirements

20.7.1 Purpose of this Section

160. This section summarises the results of the compliance assessment, detailing the activities screened out and those assessed in detail. A description of the proposed control measures that are required to address any impacts, and prevent deterioration in status or failure to meet WFD objectives set for the relevant water bodies is then detailed.

20.7.2 Summary of Assessment

161. The results of the WFD compliance assessment process outlined in this report is provided in Table 20.19.

Table 20.19 Summary of WFD compliance assessment

Water body	Stage 2	Stage 3	Deterioration in status?	Prevent objectives being achieved?
Rivers				
East Ruston Stream (GB105034055670)	✓	✓	No	No
New Cut (GB105034050940)	✓	✓	No	No
North Walsham and Dilham Canal (disused) (GB105034055710)	✓	✓	No	No
King's Beck (GB105034055730)	✓	✓	No	No
Bure (Scarrow Beck to Horstead Mill) (GB105034050932)	✓	✓	No	No
Mermaid Stream (GB105034050900)	✓	✓	No	No
Wensum US Norwich (GB105034055881)	✓	✓	No	No
Blackwater Drain (Wensum) (GB105034051120)	✓	✓	No	No
Wendling Beck (GB105034051020)	✓	✓	No	No
Wissey - Upper (GB105033047890)	✓	✓	No	No
Scarrow Beck (GB105034055740)	×	×	No	No
Bure (u/s confluence with Scarrow Beck) (GB105034055690)	×	×	No	No
Wensum (to Tatterford) (GB105034051111)	×	×	No	No
Blackwater (Wendling Beck) (GB105034051050)	×	×	No	No
Foulsham Tributary (GB105034055850)	×	×	No	No
Little Ryburgh Tributary (GB105034055860)	×	×	No	No
Nar Upstream of Abbey Farm (GB105033047791)	×	×	No	No
Bure (Horstead Mill to St Benet's Abbey (GB105034050931)	×	×	No	No
Transitional and coastal				
Norfolk East (GB650503520003)	✓	✓	No	No
Blakeney Spit Lagoon (GB610050082000)	×	×	No	No
Norfolk North (GB640503300000)	×	×	No	No
Groundwater				
Broadland Rivers Chalk & Crag (GB40501G400300)	✓	×	No	No
Cam and Ely Ouse Chalk (GB40501G400500)	✓	×	No	No
North Norfolk Chalk (GB40501G400100)	✓	×	No	No
North West Norfolk Chalk (GB40501G400200)	×	×	No	No

162. This demonstrates that, following the mitigation measures summarised in section 20.7.3, there will be no non-temporary impacts on the status of any river, coastal and groundwater bodies that are sufficient to result in deterioration in the status of these water bodies. Furthermore, the project will not prevent water body status objectives being achieved in the future. The project is therefore considered to be compliant with the requirements of the WFD.

20.7.3 Summary of Mitigation

163. The embedded control measures that will be implemented as part of the project to avoid or reduce impacts and prevent deterioration in status or failure to meet WFD objectives are presented in Table 20.14 in section 20.6.2. In addition to these embedded control measures, a range of further control measures are outlined in sections 20.6.3, 20.6.4, 20.6.5 and 20.6.6 that are specific to particular construction and operation activities. These will, when implemented, prevent adverse impacts on WFD objectives and ensure that the project is compliant with the requirements of the WFD.

20.7.4 Summary of Improvements

164. The scope to deliver measures that could improve the status of the water bodies in which the project will be located is limited to within the confines of the project boundary.

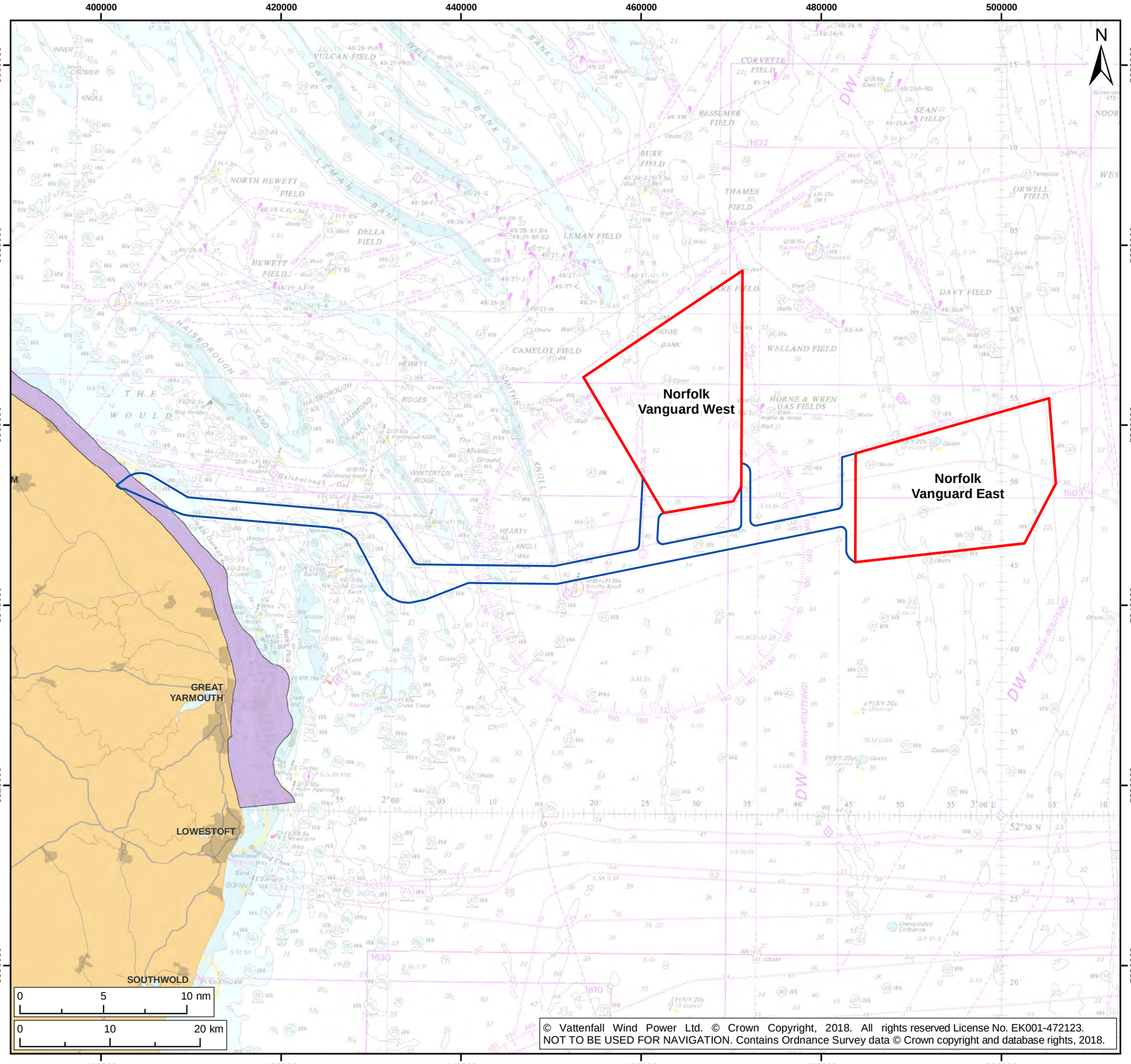
165. it may be possible to deliver localised improvements to the geomorphology and in-channel habitats supported by watercourses that would be crossed using open cut techniques, through the sympathetic reinstatement of banks (e.g. by replacing resectioned banks with more natural profiles that are typical of the natural geomorphology of the watercourse). These enhancements could locally improve the hydromorphology of the river water bodies crossed by the development (section 20.6.4) and cumulatively could potentially contribute towards an improvement in water body status.

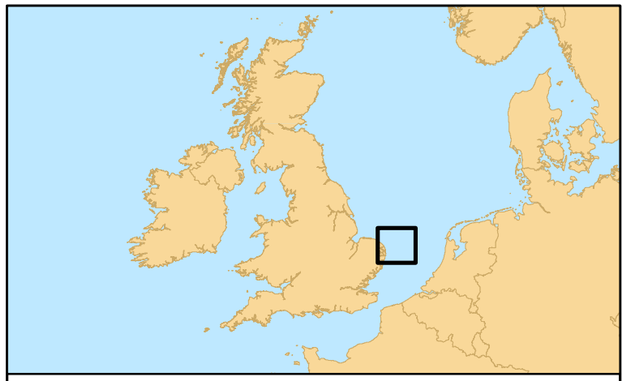
20.8 References

Bathing Waters Directive (2006/44/EC)
Defra and Environment Agency (2009). Flood and Coastal Erosion Risk Management R&D Programme expert assessment framework
EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC)
EC Environmental Quality Standards Directive (2008/105/EC)
Environment Agency (2016a). Water Framework Directive risk assessment: How to assess the risk of your activity.
Environment Agency (2016b). Clearing the Waters For All.
Environment Agency (2016c). Protecting and improving the water environment: Water Framework Directive compliance of physical works in rivers (Position Statement 488_10, version 2)
Environment Agency (2016d). Internal Environment Agency guidance on WFD deterioration and risk to the status objectives of river water bodies (Document reference 488_10_SD06).
Environment Agency (2016e). Catchment Data Explorer, [Online], Available: http://environment.data.gov.uk/catchment-planning/ [24 May 2017].
Environment Agency (2016f). Water Framework Directive assessment: estuarine and coastal waters, [Online], Available: https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters [24 July 2017].
Environment Agency (2017). Groundwater Protection Guides. Available at: https://www.gov.uk/government/collections/groundwater-protection
Environment Agency (undated) WFD Mitigation Measures Manual. Available at: http://evidence.environment-agency.gov.uk/FCERM/en/SC060065.aspx
EU Birds and Habitats Directives (EC Directive on the Conservation of Wild Birds (2009/147/EC)
European Commission (2004). Common Implementation Strategy for the Water Framework Directive (2000/60/EC)
Planning Inspectorate (2017) Advice Note 18: The Water Framework Directive.
Thames Estuary Partnership and Environment Agency (undated) Estuary Edges: Ecological Design Guidance.
The Water Framework Directive (Standards and Classification) Directions (England and Wales (2015).
UKTAG (2003). Guidance on Morphological Alterations and the Pressures and Impacts Analyses.
UKTAG (2008). Guidance for defining Good Ecological Potential. Available at: https://www.wfduk.org/resources%20/guidance-defining-good-ecological-potential

UKTAG (2011). Defining & Reporting on Groundwater Bodies.
UKTAG (2012a). Paper 11b(i) Groundwater Chemical Classification March 2012. Available at: https://www.wfduk.org/resources%20/paper-11bi-groundwater-chemical-classification-march-2012
UKTAG (2012b). Paper 11b(ii) Groundwater Quantitative Classification March 2012. Available at: https://www.wfduk.org/resources%20/paper-11bii-groundwater-quantitative-classification-march-2012
UKTAG (2013). River flow for good ecological potential. Available at: https://www.wfduk.org/tagged/heavily-modified-artificial
Water Environment (Water Framework Directive) (England and Wales) Regulations 2003.
Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.

20.9 Figures





Legend:

- Norfolk Vanguard
- Offshore cable corridor
- Norfolk East coastal water body[1]

[1] Environment Agency, 2017.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title: Offshore windfarm locations

Figure: 20.1 | Drawing No: PB4476-005-0202-007

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
04	16/05/2018	LB	ID	A3	1:425,000
03	04/04/2018	AB	ID	A3	1:425,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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590000 600000 610000 620000 630000 640000

340000 330000 320000 310000 300000

N

Scarrow Beck (GB105034055740)

East Ruston Stream (GB105034055670)

North Walsham and Dilham Canal (disused) (GB105034055710)

Bure (u/s confluence with Scarrow Beck) (GB105034055690)

Little Ryburgh Tributary (GB105034055860)

Foulsham Tributary (GB105034055850)

King's Beck (GB105034055730)

Mermaid Stream (GB105034050900)

Bure (Scarrow Beck to Horstead Mill) (GB105034050932)

Wensum (to Tatterford) (GB105034051111)

Blackwater Drain (Wensum) (GB105034051120)

Blackwater (Wendling Beck) (GB105034051050)

Nar upstream of Abbey Farm (GB105033047791)

Wendling Beck (GB105034051020)

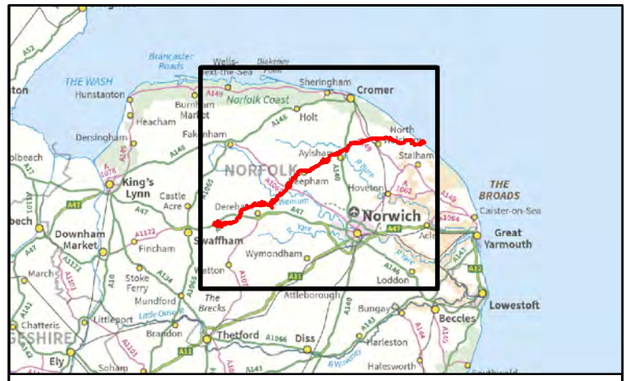
Wensum US Norwich (GB105034055881)

Bure (Horstead Mill to St Benet's Abbey) (GB105034050931)

Wensum DS Norwich (GB105034055882)

Wissey - Upper (GB105033047890)

0 5 10 km



Legend:

- Norfolk Vanguard onshore project area
- Landfall zone location
- Onshore project substation location
- National Grid substation extension location
- WFD river water bodies[1]
- WFD river water body catchments[1]

[1] Environment Agency, 2017

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title: WFD river water bodies screened into the WFD compliance assessment

Figure: 20.2 Drawing No: PB4476-005-0202-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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04	04/04/2018	AB	JD	A3	1:200,000

Co-ordinate system: British National Grid **EPSG:** 27700

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590000 600000 610000 620000 630000 640000

340000 330000 320000 310000 300000

N

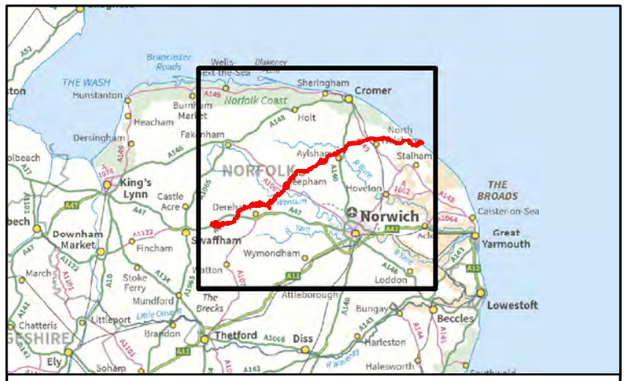
North Norfolk Chalk (GB40501G400100)

North West Norfolk Chalk (GB40501G400200)

Broadland Rivers Chalk & Crag (GB40501G400300)

Cam and Ely Ouse Chalk (GB40501G400500)

0 5 10 km



Legend:

- Norfolk Vanguard onshore project area
- Landfall zone location
- Onshore project substation location
- National Grid substation extension location

WFD groundwater bodies[1]

- Broadland Rivers Chalk & Crag
- Cam and Ely Ouse Chalk
- North Norfolk Chalk
- North West Norfolk Chalk

[1] Environment Agency, 2017

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title: WFD groundwater bodies screened into the WFD compliance assessment

Figure: 20.3 | Drawing No: PB4476-005-0202-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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03	04/04/2018	AB	ID	A3	1:200,000

Co-ordinate system: British National Grid **EPSG:** 27700

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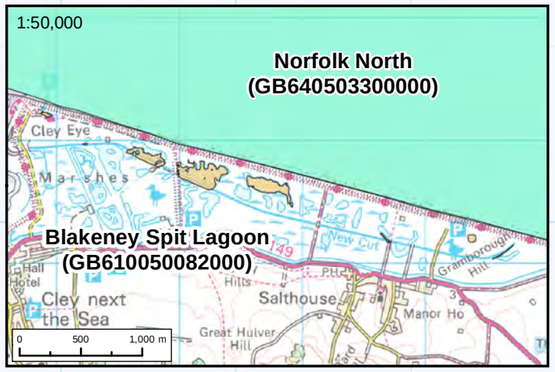
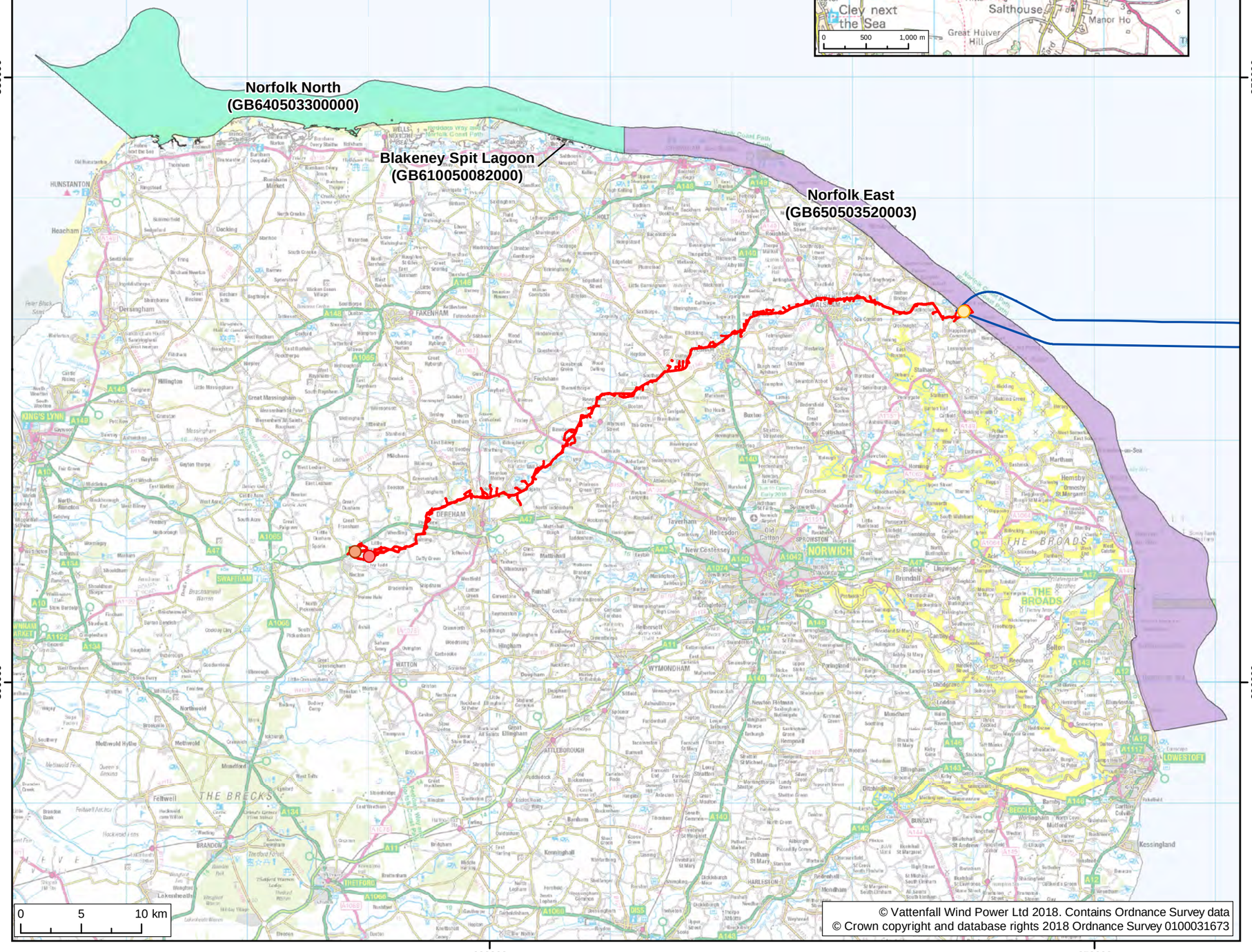
600000

650000

350000

300000





Legend:

- Norfolk Vanguard onshore project area
- Landfall zone location
- Onshore project substation location
- National Grid substation extension location
- Offshore cable corridor

WFD coastal water bodies[1]

- Blakeney Spit Lagoon
- Norfolk East
- Norfolk North

[1] Environment Agency, 2017

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title:

WFD coastal water bodies screened into the WFD compliance assessment

Figure: 20.4 | Drawing No: PB4476-005-0202-003

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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04	04/04/2018	AB	ID	A3	1:350,000

Co-ordinate system: British National Grid **EPSG:** 27700

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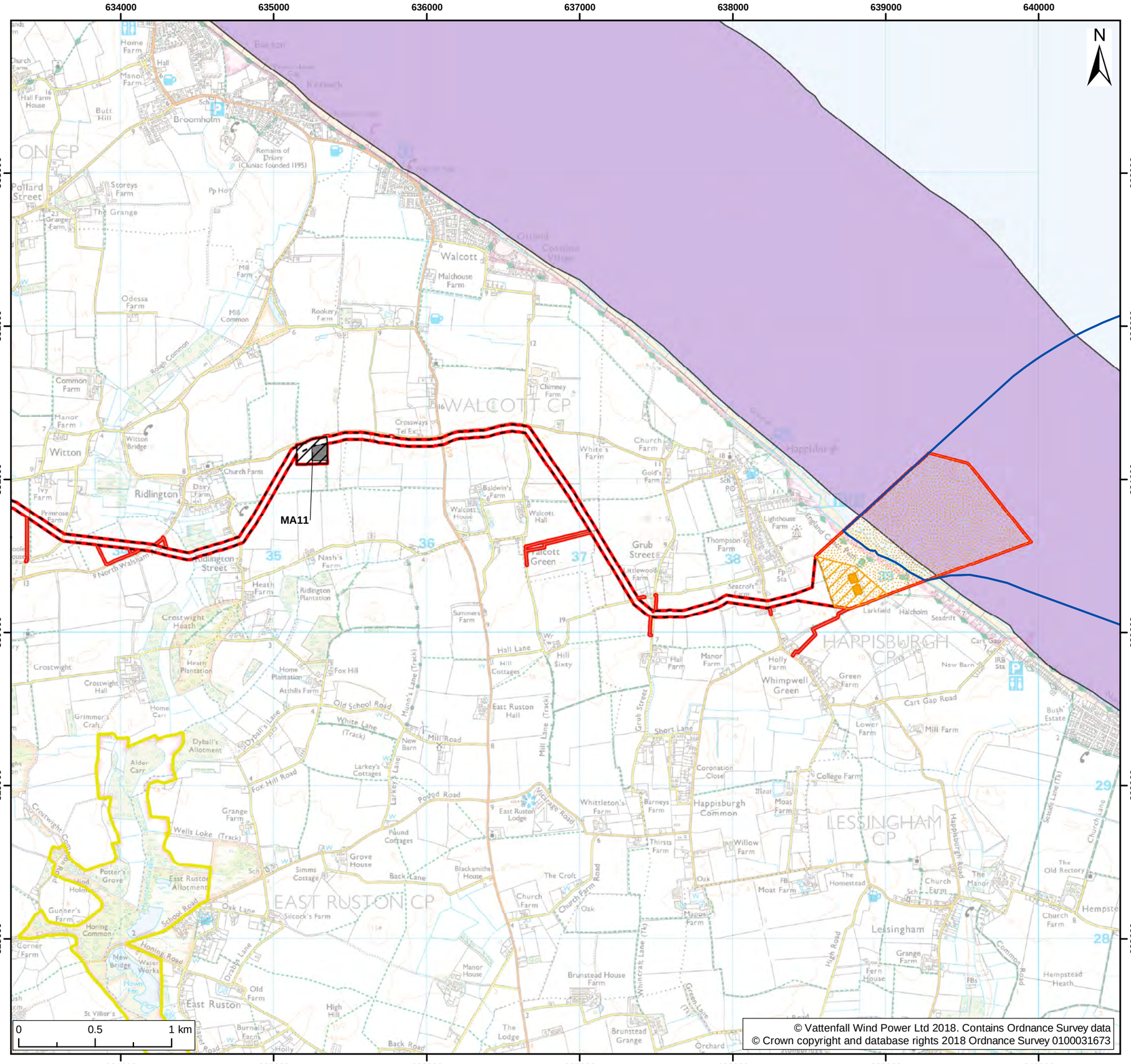

Legend:

- Offshore cable corridor
- Norfolk Vanguard onshore red line boundary

Landfall

- Landfall zone
- Landfall compound zone
- Indicative landfall compound

Onshore cable route

- Onshore cable route
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Construction access
- Operation access

WFD Water body

- Norfolk East coastal water body[1]

Protected areas

- National Park[1]

[1] Environment Agency, 2017.
[2] Natural England, 2018.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title:

Protected areas in the vicinity of the project (map 1 of 9)

Figure: 20.5 | Drawing No: PB4476-005-0202-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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04	19/04/2018	NJ	ID	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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627000 628000 629000 630000 631000 632000 633000 634000

333000 332000 331000 330000 329000 328000

Knapton Cutting (LNR)

Pigney's Wood (LNR)

TC13 TC14a TC14a/b TC14a/b TC15 TC15 MA10 MA10a TC16 TC16

SWAFIELD CP TWALSHAM CP NORTH WALSHAM BACTON CP WITTON CP HONING CP

Bradfield Knapton Paston Green Edingthorpe Edingthorpe Green Lyngate Little London Witton Witton Heath White Horse Common Honing

N

0 0.5 1 km

Legend:

- Norfolk Vanguard onshore red line boundary

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Construction access
- Operation access

Protected areas

- Local Nature Reserve (LNR)[2]
- National Park[1]

[1] Environment Agency, 2017.
[2] Natural England, 2018.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title:

Protected areas in the vicinity of the project (map 2 of 9)

Figure: 20.5 Drawing No: PB4476-005-0202-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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621000 622000 623000 624000 625000 626000 627000

333000 332000 331000 330000 329000 328000

N

MA9 TC12 TC13 TC12 TC13 TC11 TC11 TC10 MA8 TC10 TC9a/b

Felmingham Cutting (LNR)

0 0.5 1 km

Legend:

- Norfolk Vanguard onshore red line boundary

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Construction access
- Operation access

Protected areas

- Local Nature Reserve (LNR)[2]

[1] Environment Agency, 2017.
[2] Natural England, 2018.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title: Protected areas in the vicinity of the project (map 3 of 9)

Figure: 20.5 Drawing No: PB4476-005-0202-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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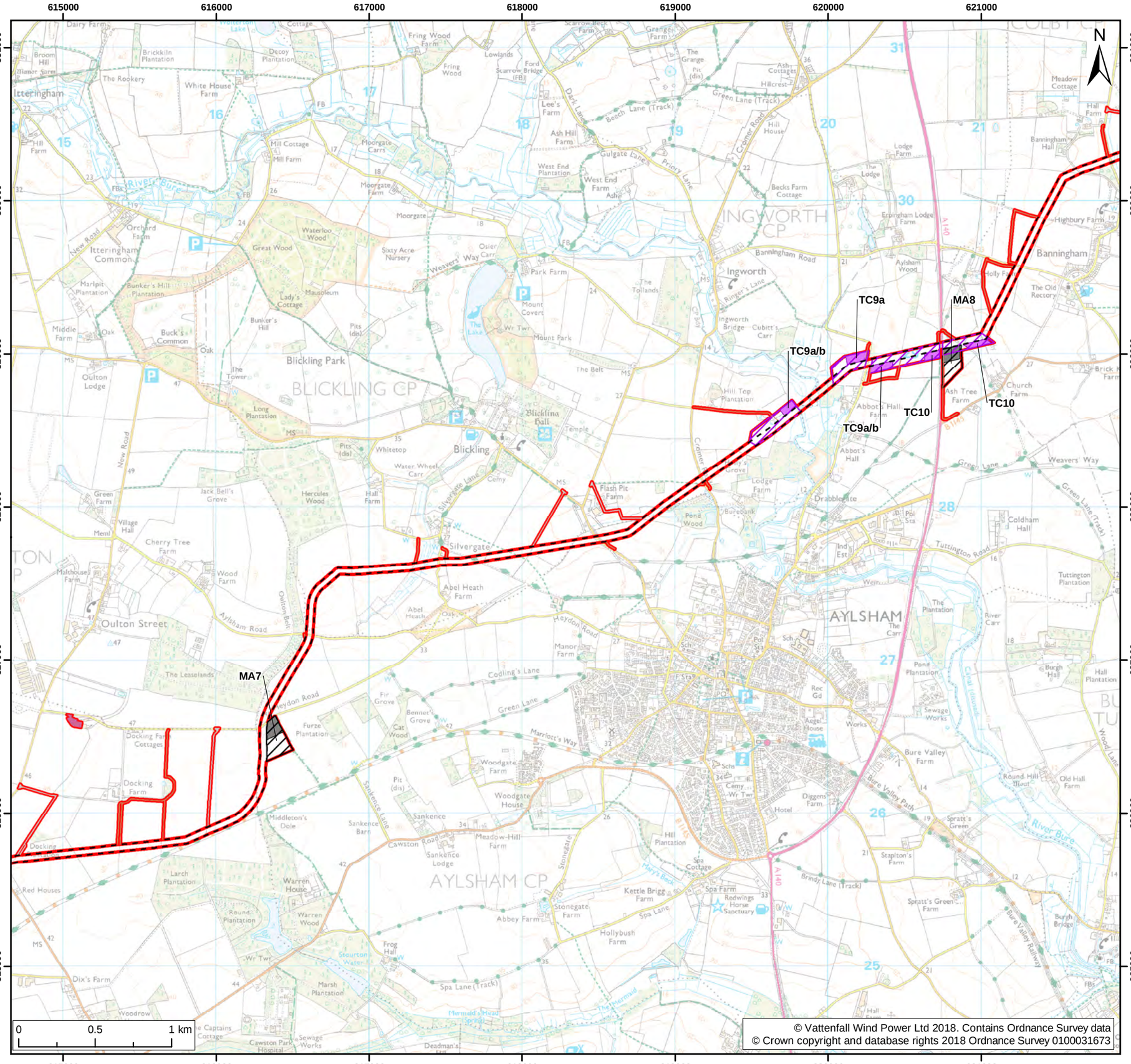

Legend:

- Norfolk Vanguard onshore red line boundary

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Cable logistics area

Access

- Construction access
- Operation access

[1] Environment Agency, 2017.
[2] Natural England, 2018.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title:

Protected areas in the vicinity of the project (map 4 of 9)

Figure: 20.5 | Drawing No: PB4476-005-0202-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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04	19/04/2018	NJ	ID	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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609000 610000 611000 612000 613000 614000 615000

327000 326000 325000 324000 323000 322000

N

MA6

TC6 TC7 TC8

Norfolk Valley Fens (SAC)

0 0.5 1 km

Legend:

- Norfolk Vanguard onshore red line boundary

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Cable logistics area

Access

- Construction access
- Operation access

Protected areas

- Special Area of Conservation (SAC)[2]

[1] Environment Agency, 2017.
[2] Natural England, 2018.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title:

Protected areas in the vicinity of the project (map 5 of 9)

Figure: 20.5 | Drawing No: PB4476-005-0202-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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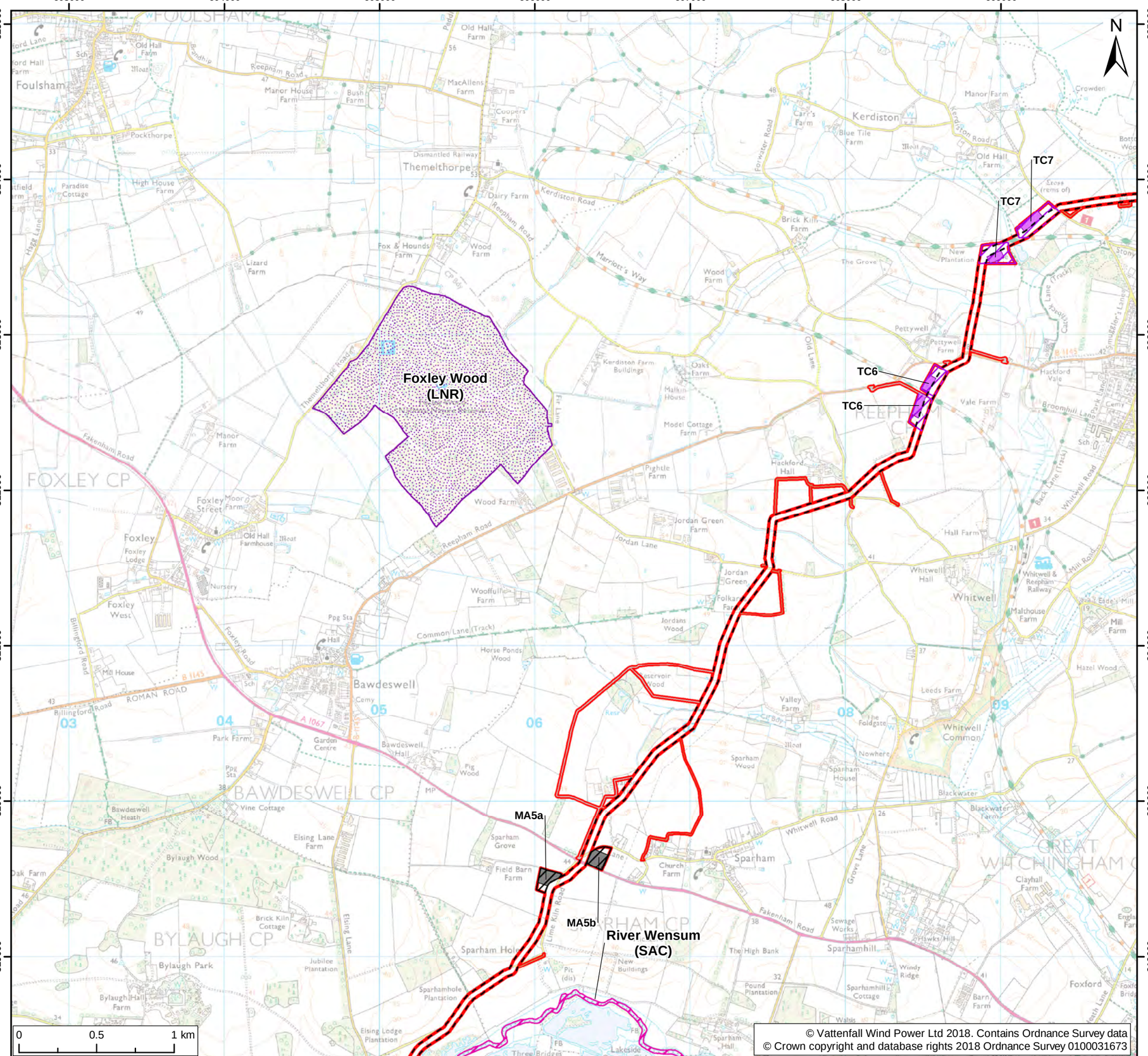

Legend:

- Norfolk Vanguard onshore red line boundary

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Construction access
- Operation access

Protected areas

- Special Area of Conservation (SAC)[2]
- National Nature Reserve (NNR)[2]

[1] Environment Agency, 2017.
[2] Natural England, 2018.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title:

Protected areas in the vicinity of the project (map 6 of 9)

Figure: 20.5 | Drawing No: PB4476-005-0202-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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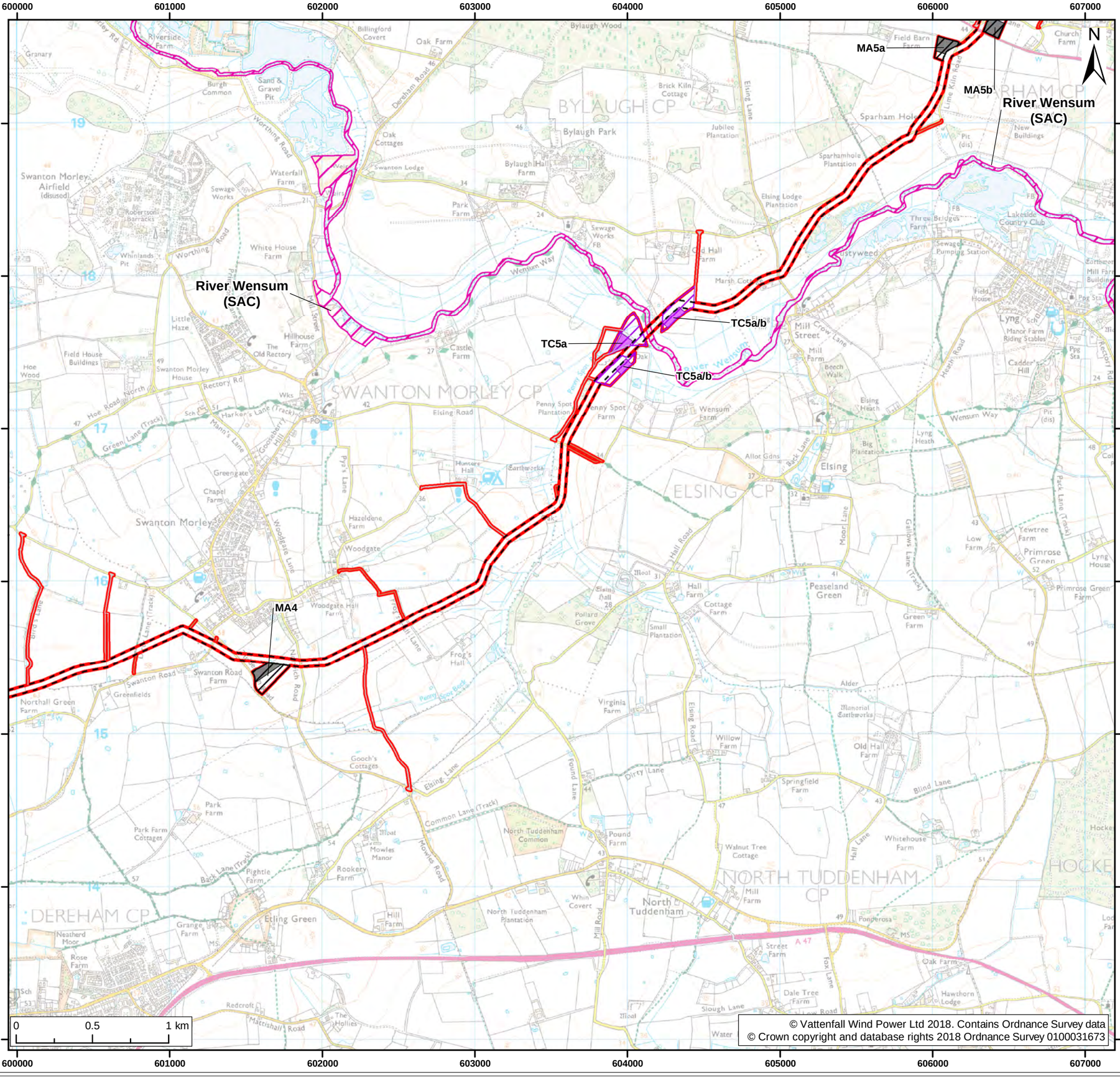

Legend:

- Norfolk Vanguard onshore red line boundary

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Construction access
- Operation access

Protected areas

- Special Area of Conservation (SAC)[2]

[1] Environment Agency, 2017.
[2] Natural England, 2018.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title:

Protected areas in the vicinity of the project (map 7 of 9)

Figure: 20.5 | Drawing No: PB4476-005-0202-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

VATTENFALL

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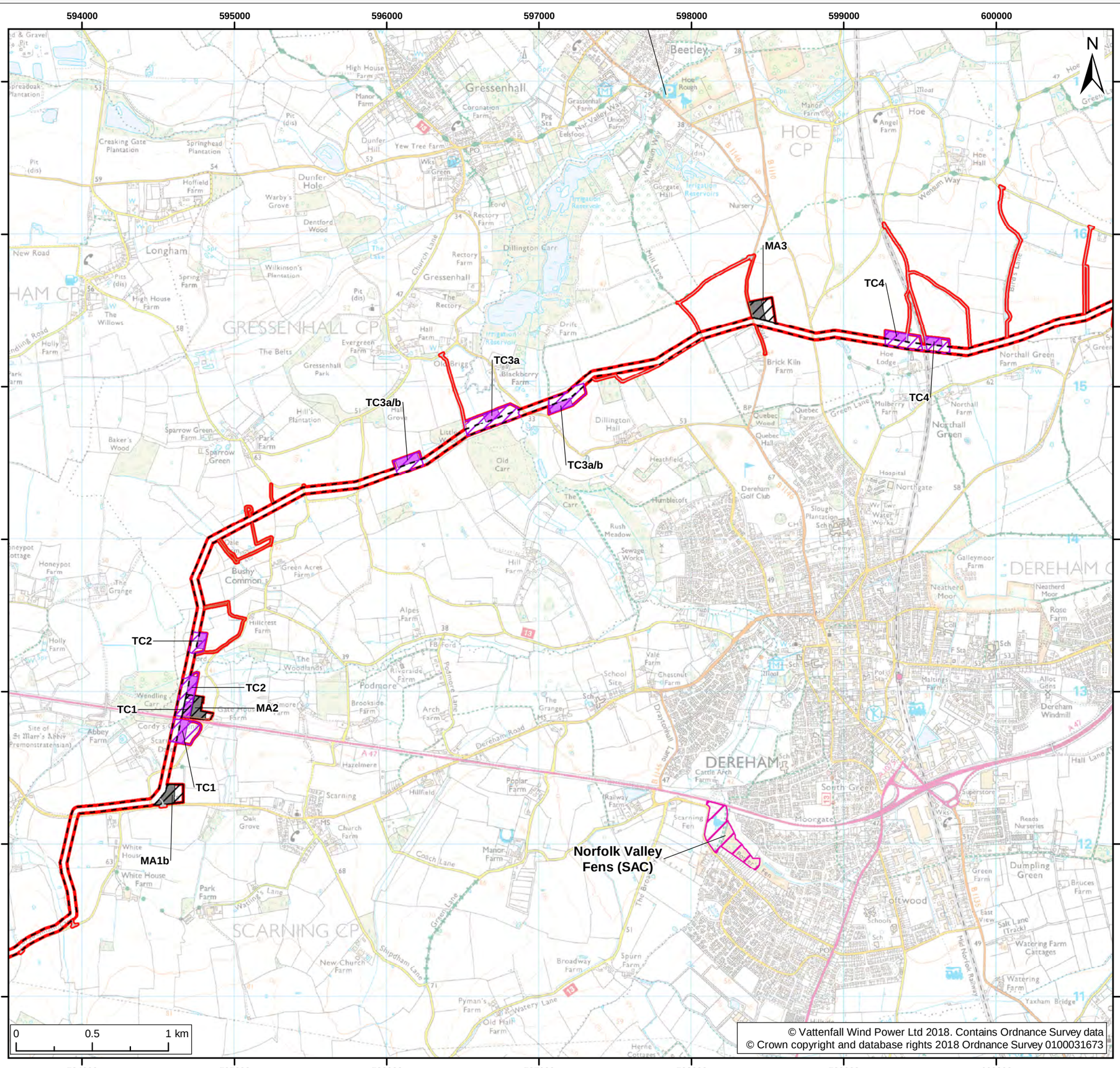

Legend:

- Norfolk Vanguard onshore red line boundary

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Construction access
- Operation access

Protected areas

- Special Area of Conservation (SAC)[2]

[1] Environment Agency, 2017.
[2] Natural England, 2018.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title:

Protected areas in the vicinity of the project (map 8 of 9)

Figure: 20.5 | Drawing No: PB4476-005-0202-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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04	19/04/2018	NJ	ID	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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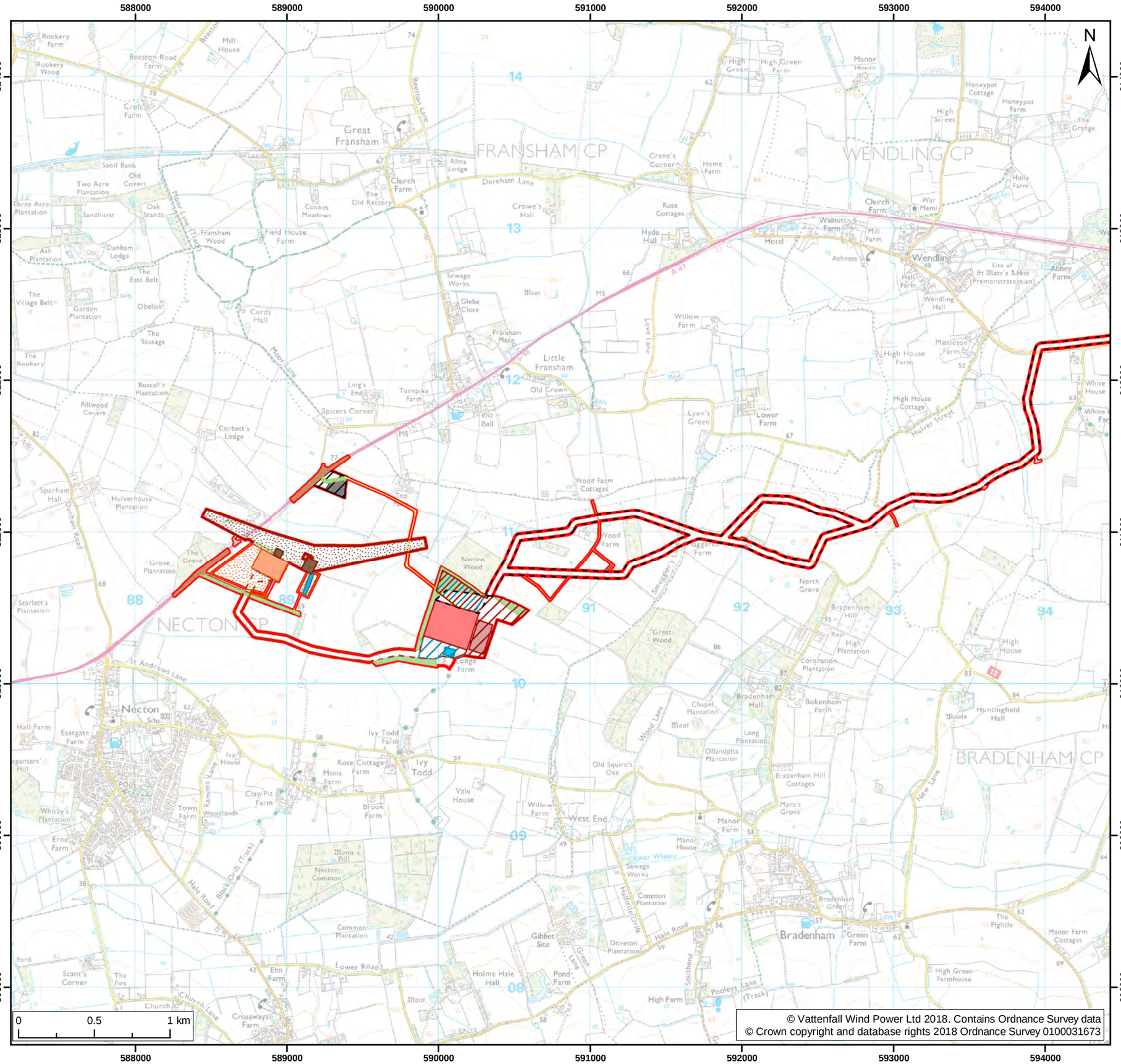

Legend:

- Norfolk Vanguard onshore red line boundary

Onshore cable route

- Onshore cable route
- Onshore 400kv cable route
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Permanent access
- Construction access
- Operation access

Onshore project substation

- Onshore project substation
- Onshore project substation temporary construction compound zone
- Indicative onshore project substation temporary construction compound

National Grid

- National Grid substation extension
- National Grid new / replacement overhead line tower
- National Grid temporary works
- Overhead line temporary works

Mitigation areas

- Attenuation pond zone
- Indicative attenuation pond
- Indicative mitigation planting

[1] Environment Agency, 2017.
[2] Natural England, 2018.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title:

Protected areas in the vicinity of the project (map 9 of 9)

Figure: 20.5 | Drawing No: PB4476-005-0202-005

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
05	16/05/2018	LB	ID	A3	1:25,000
04	19/04/2018	NJ	ID	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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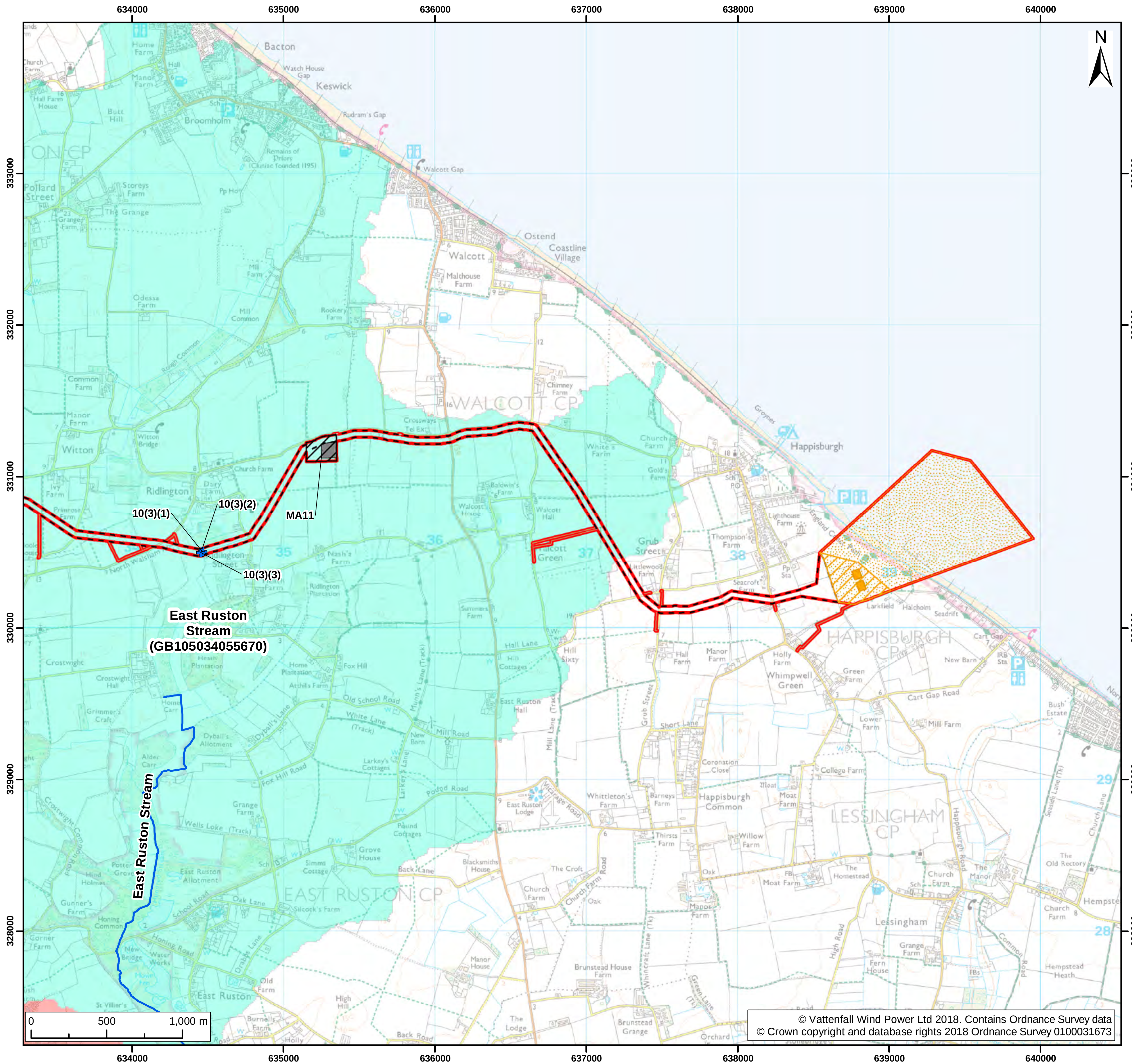

Legend:

- Norfolk Vanguard onshore red line boundary

Landfall

- Landfall zone
- Landfall compound zone
- Indicative landfall compound

Onshore cable route

- Onshore cable route
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Construction access
- Operation access

Watercourse crossing

- Crossing location[1]
- WFD river water bodies[2]

WFD river water body catchments[1]

- East Ruston Stream
- North Walsham and Dilham Canal (disused)

[1] GHD, 2018.
[2] Environment Agency, 2017.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title:

Watercourse crossings (map 1 of 9)

Figure: 20.6 Drawing No: PB4476-005-0202-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
05	16/05/2018	LB	ID	A3	1:25,000
04	19/04/2018	NJ	ID	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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26(4)(3) 25(1)(1) TC14a/b TC15 22(11)(3) 22(11)(5) 22(11)(1) 22(11)(8) TC15 MA10a TC16 TC16 TC13 TC14a/b TC14a MA10 North Walsham and Dilham Canal (disused)

SWAFIELD CP TUNSTEAD CP BACTON CP WITTON CP HONING CP NORTH WALSHAM

Knapton Bradfield Swafield Edingthorpe Witton Bacton Wood Honing

0 500 1,000 m

Legend:

- Norfolk Vanguard onshore red line boundary

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Construction access
- Operation access

Watercourse crossing

- Crossing location[1]
- WFD river water bodies[2]

WFD river water body catchments[1]

- East Ruston Stream
- King's Beck
- North Walsham and Dilham Canal (disused)

[1] GHD, 2018.
[2] Environment Agency, 2017.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title:

Watercourse crossings
(map 2 of 9)

Figure: 20.6 | Drawing No: PB4476-005-0202-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
05	16/05/2018	LB	ID	A3	1:25,000
04	19/04/2018	NJ	ID	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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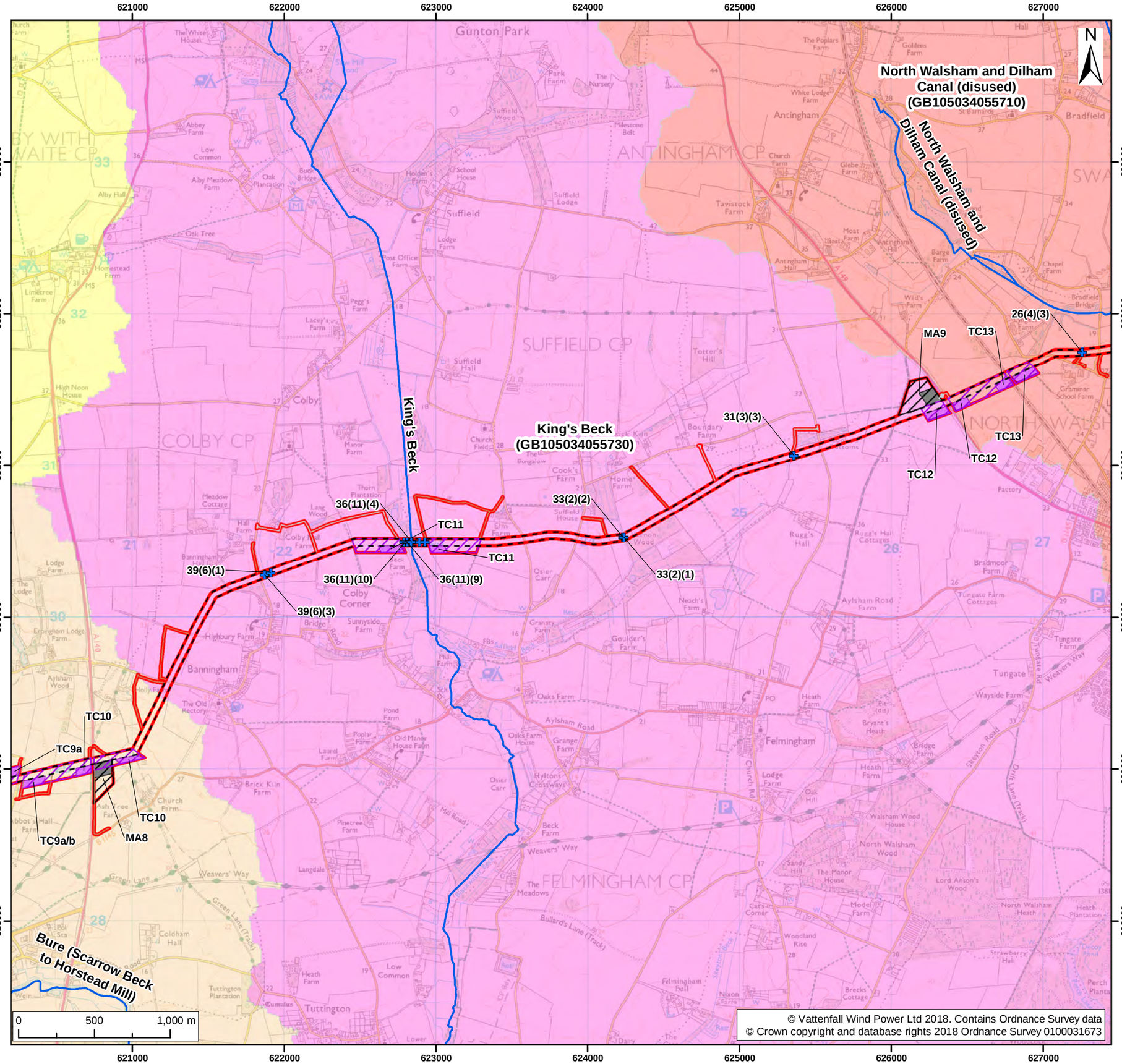

Legend:

- Norfolk Vanguard onshore red line boundary

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Construction access
- Operation access

Watercourse crossing

- Crossing location[1]
- WFD river water bodies[2]

WFD river water body catchments[1]

- Bure (Scarrow Beck to Horstead Mill)
- King's Beck
- North Walsham and Dilham Canal (disused)
- Scarrow Beck

[1] GHD, 2018.
[2] Environment Agency, 2017.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title: Watercourse crossings (map 3 of 9)

Figure: 20.6 | Drawing No: PB4476-005-0202-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
05	16/05/2018	LB	ID	A3	1:25,000
04	19/04/2018	NJ	ID	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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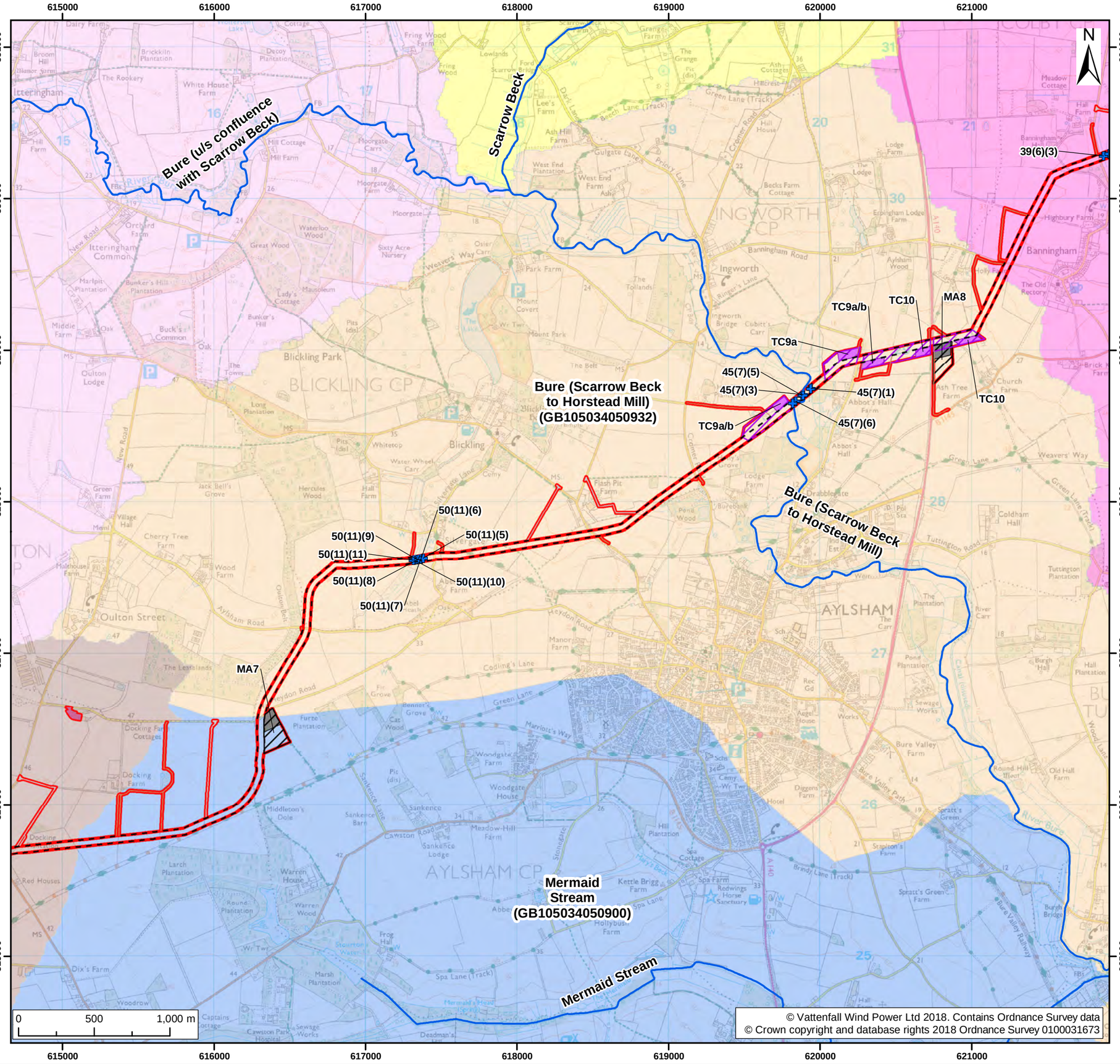

Legend:

- Norfolk Vanguard onshore red line boundary

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Cable logistics area

Access

- Construction access
- Operation access

Watercourse crossing

- Crossing location[1]
- WFD river water bodies[2]

WFD river water body catchments[1]

- Blackwater Drain (Wensum)
- Bure (Scarrow Beck to Horstead Mill)
- Bure (u/s confluence with Scarrow Beck)
- King's Beck
- Mermaid Stream
- Scarrow Beck

[1] GHD, 2018.
[2] Environment Agency, 2017.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title:

Watercourse crossings
(map 4 of 9)

Figure: 20.6 | Drawing No: PB4476-005-0202-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
05	16/05/2018	LB	ID	A3	1:25,000
04	19/04/2018	NJ	ID	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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57(2)(2)
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MA6
TC8
63(2)(1)
63(2)(2)
67(3)(2)
67(3)(1)
TC7
69(3)(3)
70(4)(2)
TC6
Blackwater Drain (Wensum) (GB105034051120)
Blackwater Drain (Wensum)

0 500 1,000 m

Legend:

- Norfolk Vanguard onshore red line boundary

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound
- Cable logistics area

Access

- Construction access
- Operation access

Watercourse crossing

- Crossing location[1]
- WFD river water bodies[2]

WFD river water body catchments[1]

- Blackwater Drain (Wensum)
- Bure (Scarrow Beck to Horstead Mill)
- Bure (u/s confluence with Scarrow Beck)
- Mermaid Stream

[1] GHD, 2018.
[2] Environment Agency, 2017.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title: Watercourse crossings (map 5 of 9)

Figure: 20.6 | Drawing No: PB4476-005-0202-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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04	19/04/2018	NJ	ID	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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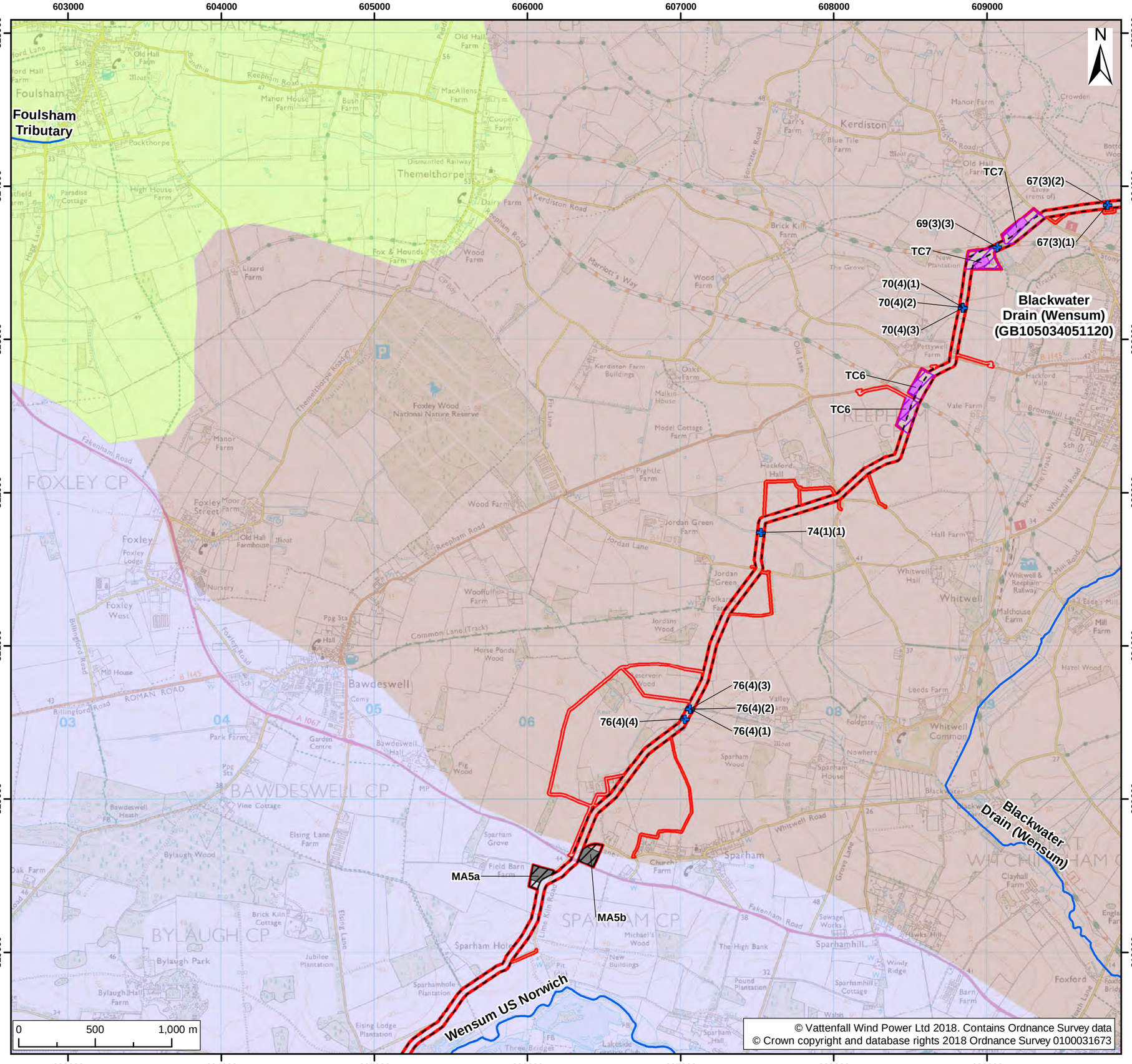

Legend:

- Norfolk Vanguard onshore red line boundary

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Construction access
- Operation access

Watercourse crossing

- Crossing location[1]
- WFD river water bodies[2]

WFD river water body catchments[1]

- Blackwater Drain (Wensum)
- Foulsham Tributary
- Wensum US Norwich

[1] GHD, 2018.
[2] Environment Agency, 2017.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title: Watercourse crossings (map 6 of 9)

Figure: 20.6 | Drawing No: PB4476-005-0202-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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04	19/04/2018	NJ	ID	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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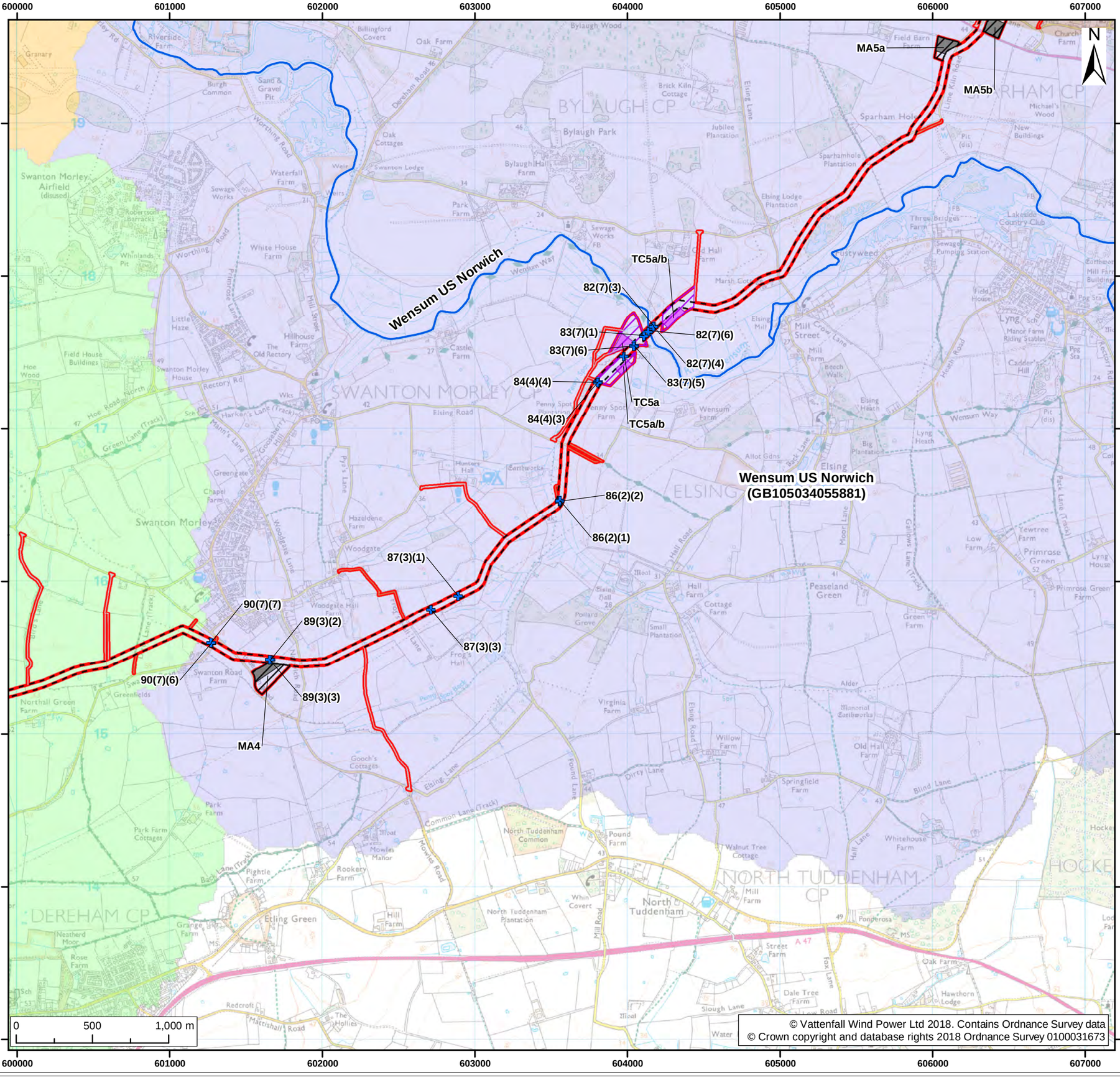

Legend:

- Norfolk Vanguard onshore red line boundary

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Construction access
- Operation access

Watercourse crossing

- Crossing location[1]
- WFD river water bodies[2]

WFD river water body catchments[1]

- Blackwater (Wendling Beck)
- Blackwater Drain (Wensum)
- Wendling Beck
- Wensum US Norwich

[1] GHD, 2018.
[2] Environment Agency, 2017.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title:

Watercourse crossings
(map 7 of 9)

Figure: 20.6 | Drawing No: PB4476-005-0202-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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04	19/04/2018	NJ	ID	A3	1:25,000

Co-ordinate system: British National Grid **EPSG:** 27700

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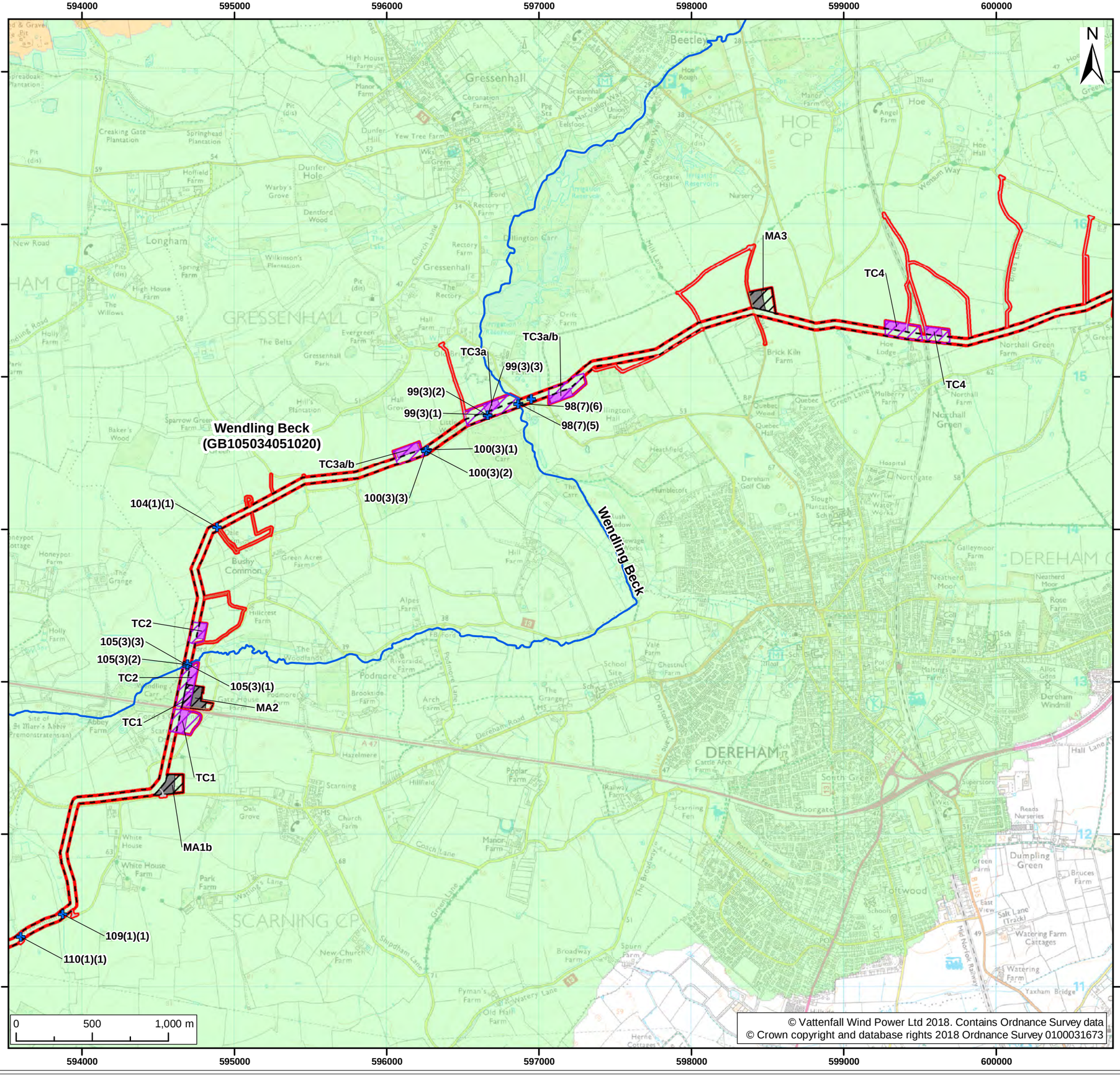

Legend:

- Norfolk Vanguard onshore red line boundary

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Construction access
- Operation access

Watercourse crossing

- Crossing location[1]
- WFD river water bodies[2]

WFD river water body catchments[1]

- Blackwater (Wendling Beck)
- Wendling Beck

[1] GHD, 2018.
[2] Environment Agency, 2017.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title:

Watercourse crossings
(map 8 of 9)

Figure: 20.6 | Drawing No: PB4476-005-0202-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid **EPSG:** 27700

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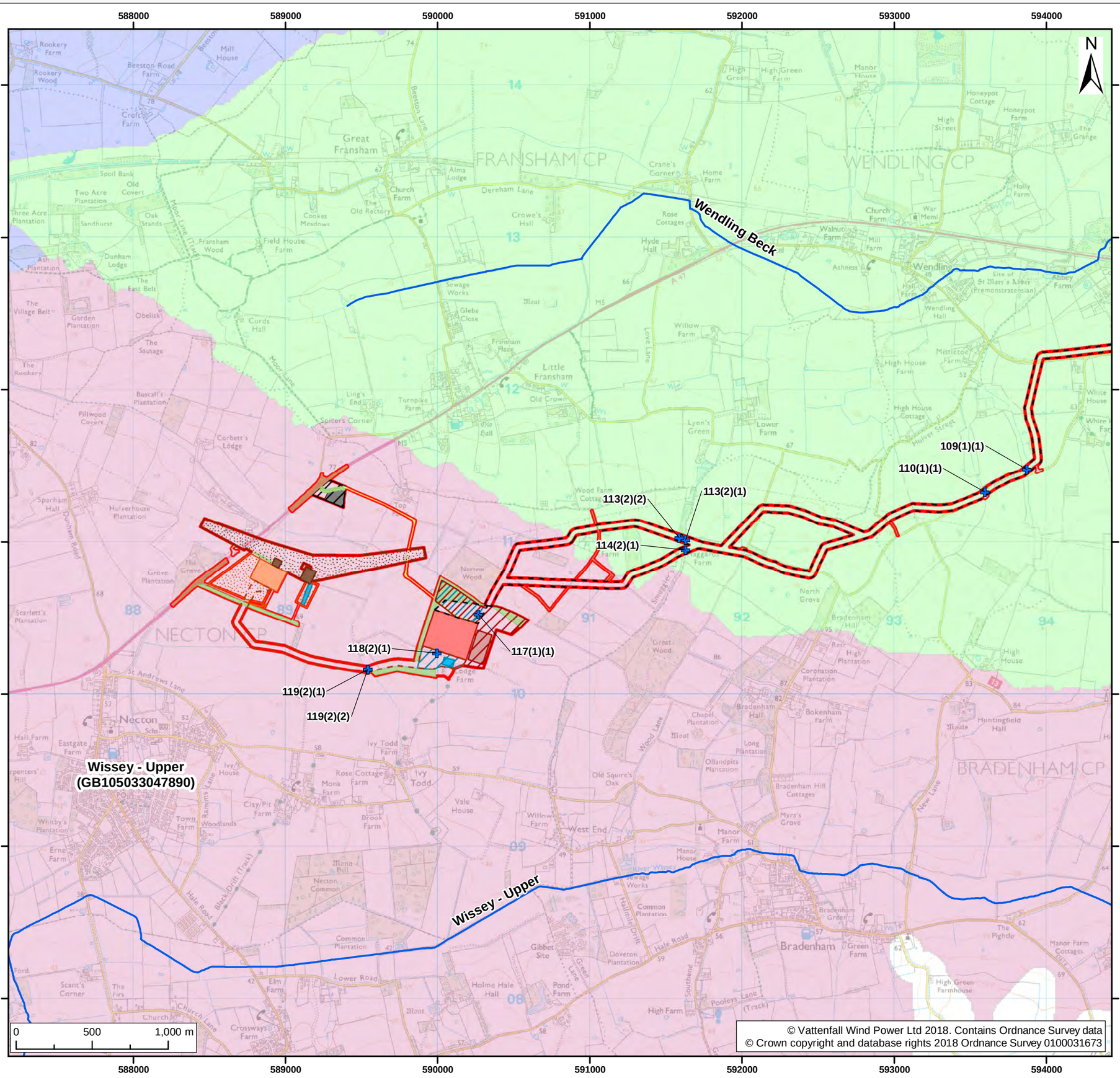

Legend:

- Norfolk Vanguard onshore red line boundary

Onshore cable route
- Onshore cable route
- Onshore 400kv cable route
- Mobilisation zone
- Indicative mobilisation area compound

Access
- Permanent access
- Construction access
- Operation access

Onshore project substation
- Onshore project substation
- Onshore project substation temporary construction compound zone
- Indicative onshore project substation temporary construction compound

National Grid
- National Grid substation extension
- National Grid new / replacement overhead line tower
- National Grid temporary works
- Overhead line temporary works

Mitigation areas
- Attenuation pond zone
- Indicative attenuation pond
- Indicative mitigation planting

Watercourse crossing
- Crossing location[1]
- WFD river water bodies[2]

WFD river water body catchments[1]
- Nar upstream of Abbey Farm
- Wendling Beck
- Wissey - Upper

[1] GHD, 2018.
[2] Environment Agency, 2017.

Project:	Report:
Norfolk Vanguard	Water Framework Directive Compliance Assessment

Title:

Watercourse crossings
(map 9 of 9)

Figure: 20.6 | Drawing No: PB4476-005-0202-006

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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20.10 Annexes

Annex 20.2.1 Scoping tables

Scoping questions for river water bodies

Parameter	Scoping question	Answer	Notes
Biology			
Aquatic flora	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or modification of habitats for aquatic plants?	Yes	Further assessment required
		No	No further action
Benthic invertebrates	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or modification of habitats for aquatic invertebrates?	Yes	Further assessment required
		No	No further action
Fish	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or modification of shelter, feeding and spawning habitats for fish?	Yes	Further assessment required
		No	No further action
Hydromorphology			
Hydrological regime	Could the activity change the volume, energy or distribution of flows in the water body?	Yes	Further assessment required
		No	No further action
Morphological conditions	Could the activity change the width, depth, bank conditions, bed substrates and structure of the riparian zone?	Yes	Further assessment required
		No	No further action
River continuity	Could the activity create a permanent barrier to the downstream movement of water and/or sediment, or the upstream movement of fish?	Yes	Further assessment required
		No	No further action
Physico-chemistry			
General	Could the activity change the temperature, pH, oxygenation, salinity or nutrient concentrations in the water body?	Yes	Further assessment required
		No	No further action
Specific pollutants	Could the activity release dangerous chemicals into the water body?	Yes	Further assessment required

Parameter	Scoping question	Answer	Notes
		No	No further action
Protected Areas			
Protected Areas	Is the activity within 2km of a protected area?	Yes	Further assessment required
		No	No further action.
Improvement measures and mitigation measures			
Improvement measures (non-A/HMWBs)	Is the activity likely to impact on one of the improvement measures in place?	Yes	Further assessment required
		No	No further action
	Is the activity likely to prevent the delivery or effectiveness of one of the improvement measures that is not yet in place?	Yes	Further assessment required
		No	No further action
Mitigation measures (A/HMWBs)	Is the activity likely to impact on one of the mitigation measures in place?	Yes	Further assessment required
		No	No further action
	Is the activity likely to prevent the delivery or effectiveness of one of the mitigation measures that is not yet in place?	Yes	Further assessment required
		No	No further action

Scoping questions for transitional and coastal water bodies

Parameter	Scoping question	Answer	Notes
Biology			
Fish (transitional water bodies)	Will the activity present a barrier to fish movement, risk or entrainment, risk to health and/or impact on a spawning area?	Yes	Further assessment required
		No	No further action
Fish (coastal water bodies)	Will the activity impinge the movement of estuarine fish, or place them at risk of entrainment?	Yes	Further assessment required
		No	No further action
Phytoplankton	Will the activity change water temperature, salinity, transparency, microbial concentrations, dissolved oxygen concentrations and/or nutrient levels of the water body for greater than 14 days or in a water body •with a phytoplankton status of moderate, poor or bad?	Yes	Further assessment required
		No	No further action
	Is the activity in a water body with a history of significant and persistent algal blooms or toxic algal b looms?	Yes	Further assessment required
		No	No further action
Flora/fauna/angiosperms/benthic invertebrates	Which type of habitat is likely to be impacted and what percentage of the habitat is impacted within the water body?	Further assessment will be required if the footprint of the activity is either: • 0.5km^2 or larger. • Covers 1% or more of the total water body area. • Within 500m of any higher sensitivity habitat. • Covers 1% of lower sensitivity habitats in the water body. For dredging calculate the footprint to be assessed above as 1.5 times the actual area to be dredged.	

Parameter	Scoping question	Answer	Notes
		No further action will be required if the above criteria are not met (i.e. the activity footprint is below the thresholds outlined above).	
Hydromorphology			
Hydromorphology	Is the water body high status/is the water body heavily modified for the same reason/use as the proposed project?	Yes	Further assessment required
		No	No further action.
	Will the activity have a significant impact on the hydromorphology of any other water body not at high status?	Yes	Further assessment required
		No	No further action
Physico-chemistry			
Chemistry	Is the activity potentially releasing dangerous chemicals from surfaces, sediments and/or outfalls into the water body?	Yes	Further assessment required
		No	No further action.
	Is the activity taking place in an area with limited water exchange (with the potential to cause thermal changes or change dilution factors)?	Yes	Further assessment required
		No	No further action.
Protection Areas			
Protected Areas	Is the activity within 2km of a protected area	Yes	Further assessment required
		No	No further action.

Parameter	Scoping question	Answer	Notes
Improvement measures and mitigation measures			
Improvement measures (non-A/HMWBs)	Is the activity likely to impact on one of the improvement measures in place?	Yes	Further assessment required
		No	No further action
	Is the activity likely to prevent the delivery or effectiveness of one of the improvement measures that is not yet in place?	Yes	Further assessment required
		No	No further action
Mitigation measures (A/HMWBs)	Is the activity likely to impact on one of the mitigation measures in place?	Yes	Further assessment required
		No	No further action
	Is the activity likely to prevent the delivery or effectiveness of one of the mitigation measures that is not yet in place?	Yes	Further assessment required
		No	No further action

Scoping questions for groundwater bodies

Parameter	Scoping question	Answer	Notes
Groundwater quantity	Will the activity change groundwater levels affecting Groundwater Dependent Terrestrial Ecosystems (GWDTEs) or dependent surface water features	Yes	Further assessment required
		No	No further action
	Will the activity (comprising abstraction) lead to saline intrusion?	Yes	Further assessment required
		No	No further action
	Will the level of proposed groundwater abstraction (dewatering) exceed recharge at a water body scale?	Yes	Further assessment required
		No	No further action
	Will the activity lead to an additional surface water body that will become non-compliant and lead to failure of the Dependent Surface Water test?	Yes	Further assessment required
		No	No further action
	Will the activity result in additional abstraction that will exceed any groundwater body scale headroom between the Fully licensed quantity and the limit imposed by the total recharge?	Yes	Further assessment required
		No	No further action
	Will the activity result in additional groundwater depletion of surface water flows that will exceed any groundwater body scale headroom between Fully Licensed depletion and the Limit imposed by the total low flows resource?	Yes	Further assessment required
		No	No further action
Groundwater quality	Will the activities have the potential to result in or exacerbate widespread diffuse pollution at a water body scale?	Yes	Further assessment required
		No	No further action.
	Will the activities have the potential to result in pollution of groundwater dependent terrestrial ecosystems (GWDTEs) or other dependent surface water features?	Yes	Further assessment required
		No	No further action.
	Will abstraction (dewatering) lead to saline intrusion?	Yes	Further assessment required
		No	No further action.
	Will the activities have the potential to cause deterioration in the quality of a drinking water	Yes	Further assessment required

Parameter	Scoping question	Answer	Notes
	abstraction?	No	No further action.
	Will the activities have the potential to result in increasing trends in pollutant concentrations or reduce the ability of the water body being able to reverse significant trends in groundwater pollutants?	Yes	Further assessment required
		No	No further action.
	Will the activities result in the failure of the 'prevent or limit' objective of the Groundwater Daughter Directive?	Yes	Further assessment required
		No	No further action.

Annex 20.2.2 Assessment of status deterioration tables

Assessment of status deterioration in river water bodies

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
Ecological status					
Biology	**Between class deterioration:** Long term impact on fish, macrophytes or benthic invertebrates that is sufficient to decrease the overall status classification of the water body.	Qualitative assessment based on predicted changes to ecological quality ratio for phytobenthos, macrophytes, benthic invertebrates or fish. OR Qualitative assessment based on expert judgement of impacts on hydromorphology and physico-chemistry.	Activity causes between-class deterioration in the ecological quality ratios for phytobenthos (River DARLEQ2), macrophytes (River LEAFPACS2), invertebrates (WHPT metric in RICT; number of taxa or average score per taxon) or fish (FCS2), as provided in the provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. OR Length of water body affected by the activity is greater than or equal to the between class deterioration thresholds for hydromorphology. OR Activity causes between-class deterioration in the thresholds for physico-chemistry provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.	Potentially non-compliant: appropriate mitigation options to be considered to reduce the impact to a lower deterioration category.	If mitigation cannot be put in place to reduce the impact to a lower deterioration category, the activity will be considered to be non-compliant and an Article 4.7 assessment will be required.
	Within class deterioration: Long term impact on fish, macrophytes or benthic invertebrates that is not sufficient to decrease the overall status classification of the	Qualitative assessment based on predicted changes to ecological quality ratio for phytobenthos, macrophytes, benthic invertebrates or fish. OR Qualitative	Activity causes within-class deterioration in the ecological quality ratios for phytobenthos (River DARLEQ2), macrophytes (River LEAFPACS2), invertebrates (WHPT metric in RICT; number of taxa or average score per taxon) or fish (FCS2), provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales)	Deterioration within class should be reduced as far as possible with mitigation. If deterioration is still likely after all mitigation has been included,	An Article 4.7 assessment may be required where good status is prevented from being achieved or water body objectives are undermined.

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	water body.	assessment based on expert judgement of impacts on hydromorphology and physico-chemistry.	2015. OR Length of water body affected by the activity is greater than the within class deterioration thresholds for hydromorphology, but less than the thresholds for between class deterioration. OR Activity causes within-class deterioration in the thresholds for physico-chemistry provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.	monitoring is likely to be required to demonstrate compliance.	
	Temporary or no deterioration: Short term impact or no impact on fish, macrophytes or benthic invertebrates, which will fully recover once the pressure is removed. OR any impacts on fish, macrophytes or benthic invertebrates are very spatially constrained.	Qualitative assessment based on predicted changes to ecological quality ratio for phytobenthos, macrophytes, benthic invertebrates or fish. OR Qualitative assessment based on expert judgement of impacts on hydromorphology and physico-chemistry.	Activity does not cause deterioration in the ecological quality ratios for phytobenthos (River DARLEQ2), macrophytes (River LEAFPACS2), invertebrates (WHPT metric in RICT; number of taxa or average score per taxon) or fish (FCS2), provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. OR Length of water body affected is less than or equal to the no deterioration / short term impact thresholds for hydromorphology. OR Activity does not cause deterioration in the thresholds for physico-chemistry provided in the Water Framework Directive (Standards and Classification) Directions (England and	Compliant: no action required.	

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
			Wales) 2015. OR Any deterioration is temporally constrained and insufficient to impact upon biological quality elements.		
Hydromorphology	**Between class deterioration:** Long term impact on hydrological regime or morphological conditions that is sufficient to decrease the overall status classification of the water body.	Qualitative assessment of changes to hydromorphological quality elements based on WFD Expert Assessment Framework (Defra, 2009).	Physical modifications (bank reinforcement, bank reprofiling, embankment, bypass channel) > 100 m of river channel length. OR Management activities (management of in-channel or riparian vegetation, woody debris) > 200 m of river length. OR Long term barrier to river continuity (e.g. weir, culvert) or long term change to channel geomorphology (widening, deepening, straightening or realigning).	Potentially non-compliant: appropriate mitigation options to be considered to reduce the impact to a lower deterioration category.	If mitigation cannot be put in place to reduce the impact to a lower deterioration category, the activity will be considered to be non-compliant and an Article 4.7 assessment will be required.
	Within class deterioration: Long term impact on hydrological regime or morphological conditions that is not sufficient to decrease the overall status classification of the water body.		Physical modifications (bank reinforcement, bank reprofiling, embankment, bypass channel) > 10 m but ≤ 100 m of river channel length. OR Management activities (management of in-channel or riparian vegetation, woody debris) > 20 m but ≤ 200 m of river length. OR Bridges and crossings that include in-channel supports and/or abutments that are not set back from the channel.	Deterioration within class should be reduced as far as possible with mitigation. If deterioration is still likely after all mitigation has been included, monitoring is likely to be required to demonstrate compliance.	An Article 4.7 assessment may be required where good status is prevented from being achieved or water body objectives are undermined.

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	Temporary or no deterioration: Short term impact or no impact on hydrological regime, morphological conditions or river continuity, which will fully recover once the pressure is removed. OR any impacts on hydrological regime, morphological conditions or river continuity are very spatially constrained.		Physical modifications (bank reinforcement, bank reprofiling, embankment, bypass channel) ≤ 10 m of river channel length. OR Management activities (management of in-channel or riparian vegetation, woody debris) ≤ 20 m of river length. OR Bridges and crossings with abutments that are set back from the channel and that do not include in-channel supports. OR Any impact is temporally constrained and insufficient to impact upon biological quality elements.	Compliant: no further action required.	
Physico-chemistry	**Between class deterioration:** Long term impact on temperature, pH, oxygenation, salinity, nutrient concentrations or concentrations of specific pollutants that is sufficient to decrease the overall status classification of the water body.	Qualitative assessment based on predicted changes to physico-chemical quality elements, using an expert judgement approach.	Activity causes between-class deterioration in the thresholds provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.	Potentially non-compliant: appropriate mitigation options to be considered to reduce the impact to a lower deterioration category. If impact on ecology not identified for parameters	If mitigation cannot be put in place to reduce the impact to a lower deterioration category, the activity will be considered to be non-compliant and an Article 4.7 assessment will be required.

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
				without thresholds, compliant and no action required.	
	Within class deterioration: Long term impact on temperature, pH, oxygenation, salinity, nutrient concentrations or concentrations of specific pollutants that is not sufficient to decrease the overall status classification of the water body.		Activity causes within-class deterioration in the thresholds provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.	Deterioration within class should be reduced as far as possible with mitigation. If deterioration is still likely after all mitigation has been included, monitoring is likely to be required to demonstrate compliance. If impact on ecology not identified for parameters without thresholds, compliant and no action required.	An Article 4.7 assessment may be required where good status is prevented from being achieved or water body objectives are undermined.
	Temporary or no deterioration: Short term impact or no impact on temperature, pH, oxygenation, salinity,		Activity does not cause deterioration in the thresholds for physico-chemistry provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.	Compliant: no further action required.	

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	nutrient concentrations or concentrations of specific pollutants, which will fully recover once the pressure is removed. OR any impacts on temperature, pH, oxygenation, salinity, nutrient concentrations or concentrations of specific pollutants are very spatially constrained.		OR Any impact is temporally constrained and insufficient to impact upon biological quality elements. OR Any impact is spatially constrained and insufficient to impact upon biological quality elements.		
Chemical status					
Priority substances	**Between class deterioration:** Long term impact on concentrations of priority substances that is sufficient to decrease the overall status classification of the water body.	Qualitative assessment based on predicted changes to chemical quality elements.	Activity causes concentrations to exceed the EQS provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.	Potentially non-compliant: appropriate mitigation options to be considered to reduce the impact to a lower deterioration category.	If mitigation cannot be put in place to reduce the impact to a lower deterioration category, the activity will be considered to be non-compliant and an Article 4.7 assessment will be required.
	Within class deterioration:		*Baseline concentrations below EQS:* Activity causes concentrations to increase without	Deterioration within class should	An Article 4.7 assessment may be

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	Long term impact on concentrations of priority substances that is not sufficient to decrease the overall status classification of the water body.		exceeding the EQS provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. *Baseline concentrations above EQS:* Activity causes concentrations that already exceed the EQS provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 to increase further.	be reduced as far as possible with mitigation. If deterioration is still likely after all mitigation has been included, monitoring is likely to be required to demonstrate compliance.	required where good status is prevented from being achieved or water body objectives are undermined.
	Temporary or no deterioration: Short term impact or no impact on concentrations of priority substances, which will fully recover once the pressure is removed. OR any impacts on concentrations of priority substances are very spatially constrained.		Activity does not cause deterioration in the thresholds for chemistry provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. OR Any impact is temporally constrained and insufficient to impact upon biological quality elements. OR Any impact is spatially constrained and insufficient to impact upon biological quality elements.	Compliant: no further action required.	
Protected Areas					
Habitats Directive and Birds Directive	Will be considered within the HRA and therefore no additional requirements for WFD compliance assessment.				

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
Nutrient sensitive sites	Will be considered within the EIA and therefore unlikely to be addition requirements for WFD compliance assessment if no impacts or minor impacts identified.				

Assessment of status deterioration in coastal water bodies

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
Ecological status					
Biology	**Between class deterioration:** Long term impact on phytoplankton and other aquatic flora, benthic invertebrates or fish that is sufficient to decrease the overall status classification of the water body.	Qualitative assessment based on predicted changes to the ecological quality ratio for phytoplankton or benthic invertebrates. OR Qualitative assessment based on expert judgement of impacts on hydromorphology and physico-chemistry.	Activity causes between-class deterioration in the ecological quality ratios for phytoplankton (Coastal Water Phytoplankton Tool) or benthic invertebrates (Infaunal Quality Index) provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. Note that this option is only suitable for use in WFD habitats. For all other habitats (i.e. those for which metrics have not been developed), the alternative options below must be used. OR Area of water body affected by the activity is greater than or equal to the between class deterioration thresholds for hydromorphology. OR Activity causes between-class deterioration in the thresholds for physico-chemistry provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.	Potentially non-compliant: appropriate mitigation options to be considered to reduce the impact to a lower deterioration category.	If mitigation cannot be put in place to reduce the impact to a lower deterioration category, activity will be considered to be non-compliant and an Article 4.7 assessment will be required.
	Within class deterioration: Long term impact on phytoplankton and other aquatic flora, benthic invertebrates or fish that is not sufficient to decrease	Qualitative assessment based on predicted changes to the ecological quality ratio for phytoplankton or benthic invertebrates. OR Qualitative	Activity causes within-class deterioration in the ecological quality ratios for phytoplankton (Coastal Water Phytoplankton Tool) or benthic invertebrates (Infaunal Quality Index) provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. Note that this option is only suitable for use in WFD habitats. For all other	Deterioration within class should be reduced as far as possible with mitigation. If deterioration is still likely after all	An Article 4.7 assessment may be required where good status is prevented from being achieved or water body objectives are undermined.

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	the overall status classification of the water body.	assessment based on expert judgement of impacts on hydromorphology and physico-chemistry.	habitats (i.e. those for which metrics have not been developed), the alternative options below must be used. OR Area of water body affected by the activity is greater than the within class deterioration thresholds for hydromorphology, but less than the thresholds for between class deterioration. OR Activity causes within-class deterioration in the thresholds for physico-chemistry provided in the Water Framework Directive (standards and Classification) Directions (England and Wales) 2015.	mitigation has been included, monitoring is likely to be required to demonstrate compliance.	
	Temporary or no deterioration: Short term impact or no impact on phytoplankton and other aquatic flora, benthic invertebrates or fish, which will fully recover once the pressure is removed. OR any impacts on phytoplankton and other aquatic flora, benthic invertebrates or fish are very spatially constrained.	Qualitative assessment based on predicted changes to the ecological quality ratio for phytoplankton or benthic invertebrates. OR Qualitative assessment based on expert judgement of impacts on hydromorphology and physico-chemistry.	Activity does not cause deterioration in the ecological quality ratios for phytoplankton (Coastal Water Phytoplankton Tool) or benthic invertebrates (Infaunal Quality Index) provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. Note that this option is only suitable for use in WFD habitats. For all other habitats (i.e. those for which metrics have not been developed), the alternative options below must be used. OR Area of water body affected is less than or equal to the no deterioration / short term impact thresholds for hydromorphology. OR Activity does not cause deterioration in the	Compliant: no action required.	

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
			thresholds for physico-chemistry provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. OR Any deterioration is temporally constrained and insufficient to impact upon biological quality elements.		
Hydromorphology	**Between class deterioration:** Long term impact on morphological conditions or tidal regime that is sufficient to decrease the overall status classification of the water body.	Qualitative assessment based on predicted changes to coastal processes.	Activity results in permanent changes to wave conditions or sediment transport processes in a significant proportion of the water body area.	Potentially non-compliant: appropriate mitigation options to be considered to reduce the impact to a lower deterioration category.	If mitigation cannot be put in place to reduce the impact to a lower deterioration category, activity will be considered to be non-compliant and an Article 4.7 assessment will be required.
	Within class deterioration: Long term impact on morphological conditions or tidal regime that is not sufficient to decrease the overall status classification of the water body.	Qualitative assessment based on predicted changes to coastal processes.	Activity results in permanent changes to wave conditions or sediment transport processes in a small proportion of the water body area.	Deterioration within class should be reduced as far as possible with mitigation. If deterioration is still likely after all mitigation has been included, monitoring is	An Article 4.7 assessment may be required where good status is prevented from being achieved or water body objectives are undermined.

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
				likely to be required to demonstrate compliance.	
	Temporary or no deterioration: Short term impact or no impact on morphological conditions or tidal regime, which will fully recover once the pressure is removed. OR any impacts on morphological conditions or tidal regime are very spatially constrained.	Qualitative assessment based on expert judgement and interpretation of coastal process data.	Any deterioration is temporally constrained and insufficient to impact upon biological quality elements. OR Any impact is spatially constrained and insufficient to impact upon biological quality elements.	Compliant: no action required.	
Physico-chemistry	**Between class deterioration:** Long term impact on transparency, temperature, oxygenation, salinity, nutrient concentrations or concentrations of specific pollutants that is sufficient to decrease the overall	Qualitative assessment based on predicted changes to physico-chemical quality elements.	Activity causes between-class deterioration in the thresholds provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.	Potentially non-compliant: appropriate mitigation options to be considered to reduce the impact to a lower deterioration category. For parameters without thresholds (such	If mitigation cannot be put in place to reduce the impact to a lower deterioration category, activity will be considered to be non-compliant and an Article 4.7 assessment will be required.

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	status classification of the water body.			as temperature) and impact on ecology not identified, compliant and no action required.	
	Within class deterioration: Long term impact on transparency, temperature, oxygenation, salinity, nutrient concentrations or concentrations of specific pollutants that is not sufficient to decrease the overall status classification of the water body.	Qualitative assessment based on predicted changes to physico-chemical quality elements.	Activity causes within-class deterioration in the thresholds provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.	Deterioration within class should be reduced as far as possible with mitigation. If deterioration is still likely after all mitigation has been included, monitoring is likely to be required to demonstrate compliance. If impact on ecology not identified for parameters without thresholds, compliant and no action required.	An Article 4.7 assessment may be required where good status is prevented from being achieved or water body objectives are undermined.
	Temporary or no deterioration:	Qualitative assessment based on predicted	Activity does not cause deterioration in the thresholds for physico-chemistry provided in	Compliant: no further action required.	

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	Short term impact or no impact on transparency, temperature, oxygenation, salinity, nutrient concentrations or concentrations of specific pollutants, which will fully recover once the pressure is removed. OR any impacts on transparency, temperature, oxygenation, salinity, nutrient concentrations or concentrations of specific pollutants are very spatially constrained.	changes to physico-chemical quality elements.	the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. OR Any impact is temporally constrained and insufficient to impact upon biological quality elements. OR Any impact is spatially constrained and insufficient to impact upon biological quality elements.		
Chemical status					
Priority substances	**Between class deterioration:** Long term impact on concentrations of priority substances that is sufficient to decrease the overall	Qualitative assessment based on predicted changes to chemical quality elements. Water quality modelling of discharges will consider baseline environment	Activity causes concentrations to exceed the EQS provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.	Potentially non-compliant: appropriate mitigation options to be considered to reduce the impact to a lower	If mitigation cannot be put in place to reduce the impact to a lower deterioration category, the activity will be considered to

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	status classification of the water body.	and risk of exceeding EQS over long periods.		deterioration category.	be non-compliant and an Article 4.7 assessment will be required.
	Within class deterioration: Long term impact on concentrations of priority substances that is not sufficient to decrease the overall status classification of the water body.	Qualitative assessment based on predicted changes to chemical quality elements. Water quality modelling of discharges will consider baseline environment.	*Baseline concentrations below EQS:* Activity causes concentrations to increase without exceeding the EQS provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. *Baseline concentrations above EQS:* Activity causes concentrations that already exceed the EQS provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 to increase further.	Deterioration within class should be reduced as far as possible with mitigation. If deterioration is still likely after all mitigation has been included, monitoring is likely to be required to demonstrate compliance.	An Article 4.7 assessment may be required where good status is prevented from being achieved or water body objectives are undermined.
	Temporary or no deterioration: Short term impact or no impact on concentrations of priority substances, which will fully recover once the pressure is removed. OR any impacts on concentrations of	Qualitative assessment based on predicted changes to chemical quality elements using an expert judgement approach.	Activity does not cause deterioration in the thresholds for priority substances provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. OR Any impact is temporally constrained and insufficient to impact upon biological quality elements. OR Any impact is spatially constrained and insufficient to impact upon biological quality	Compliant: no further action required.	

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	priority substances are very spatially constrained.		elements.		
Protected Areas					
Shellfish/bathing water standards	Will be considered using the relevant standards as part of the WFD compliance assessment.				
Habitats Directive	Will be considered within the HRA and therefore no additional requirements for WFD compliance assessment.				
Nutrient sensitive sites	Will be considered within the EIA and therefore unlikely to be addition requirements for WFD compliance assessment if no impacts or minor impacts identified.				

Assessment of status deterioration in transitional water bodies

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
Ecological status					
Biology	**Between class deterioration:** Long term impact on phytoplankton and other aquatic flora, benthic invertebrates or fish that is sufficient to decrease the overall status classification of the water body.	Qualitative assessment based on predicted changes to the ecological quality ratio for phytoplankton, benthic invertebrates or fish. OR Qualitative assessment based on expert judgement of impacts on hydromorphology and physico-chemistry.	Activity causes between-class deterioration in the ecological quality ratios for phytoplankton (Transitional Water Phytoplankton Tool), benthic invertebrates (Infaunal Quality Index) or fish (Transitional Fish Classification Index) provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. Note that this option is only suitable for use in WFD habitats. For all other habitats (i.e. those for which metrics have not been developed), the alternative options below must be used. OR Area of water body affected by the activity is greater than or equal to the between class deterioration thresholds for hydromorphology. OR Activity causes between-class deterioration in the thresholds for physico-chemistry provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.	Potentially non-compliant: appropriate mitigation options to be considered to reduce the impact to a lower deterioration category.	If mitigation cannot be put in place to reduce the impact to a lower deterioration category, activity will be considered to be non-compliant and an Article 4.7 assessment will be required.
	Within class deterioration: Long term impact on phytoplankton and other aquatic flora, benthic invertebrates or fish that is not	Qualitative assessment based on predicted changes to the ecological quality ratio for phytoplankton, benthic invertebrates or	Activity causes within-class deterioration in the ecological quality ratios for phytoplankton (Transitional Water Phytoplankton Tool), benthic invertebrates (Infaunal Quality Index) or fish (Transitional Fish Classification Index) provided in the Water Framework Directive (Standards and Classification) Directions	Deterioration within class should be reduced as far as possible with mitigation. If deterioration is	An Article 4.7 assessment may be required where good status is prevented from being achieved or water body objectives are

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	sufficient to decrease the overall status classification of the water body.	fish. OR Qualitative assessment based on expert judgement of impacts on hydromorphology and physico-chemistry.	(England and Wales) 2015. Note that this option is only suitable for use in WFD habitats. For all other habitats (i.e. those for which metrics have not been developed), the alternative options below must be used. OR Area of water body affected by the activity is greater than the within class deterioration thresholds for hydromorphology, but less than the thresholds for between class deterioration. OR Activity causes within-class deterioration in the thresholds for physico-chemistry provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.	still likely after all mitigation has been included, monitoring is likely to be required to demonstrate compliance.	undermined.
	Temporary or no deterioration: Short term impact or no impact on phytoplankton and other aquatic flora, benthic invertebrates or fish, which will fully recover once the pressure is removed. OR any impacts on phytoplankton and other aquatic flora, benthic invertebrates	Qualitative assessment based on predicted changes to the ecological quality ratio for phytoplankton, benthic invertebrates or fish. OR Qualitative assessment based on expert judgement of impacts on hydromorphology and physico-chemistry.	Activity does not cause deterioration in the ecological quality ratios for phytoplankton (Transitional Water Phytoplankton Tool), benthic invertebrates (Infaunal Quality Index) or fish (Transitional Fish Classification Index) provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. Note that this option is only suitable for use in WFD habitats. For all other habitats (i.e. those for which metrics have not been developed), the alternative options below must be used. OR Area of water body affected is less than or equal to the no deterioration / short term	Compliant: no action required.	

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	or fish are very spatially constrained.		impact thresholds for hydromorphology. OR Activity does not cause deterioration in the thresholds for physico-chemistry provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. OR Any deterioration is temporally constrained and insufficient to impact upon biological quality elements.		
Hydromorphology	**Between class deterioration:** Long term impact on morphological conditions or tidal regime that is sufficient to decrease the overall status classification of the water body.	Qualitative assessment based on predicted changes to coastal processes obtained from modelling.	Activity results in permanent changes to wave conditions or sediment transport processes in a significant proportion of the water body area.	Potentially non-compliant: appropriate mitigation options to be considered to reduce the impact to a lower deterioration category.	If mitigation cannot be put in place to reduce the impact to a lower deterioration category, activity will be considered to be non-compliant and an Article 4.7 assessment will be required.
	Within class deterioration: Long term impact on morphological conditions or tidal regime that is not sufficient to decrease the overall status classification of the	Qualitative assessment based on predicted changes to coastal processes.	Activity results in permanent changes to wave conditions or sediment transport processes in a small proportion of the water body area.	Deterioration within class should be reduced as far as possible with mitigation. If deterioration is still likely after all mitigation has	An Article 4.7 assessment may be required where good status is prevented from being achieved or water body objectives are undermined.

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	water body.			been included, monitoring is likely to be required to demonstrate compliance.	
	Temporary or no deterioration: Short term impact or no impact on morphological conditions or tidal regime, which will fully recover once the pressure is removed. OR any impacts on morphological conditions or tidal regime are very spatially constrained.	Qualitative assessment based on expert judgement and interpretation of coastal process data.	Any deterioration is temporally constrained and insufficient to impact upon biological quality elements. OR Any deterioration is spatially constrained and insufficient to impact upon biological quality elements.	Compliant: no action required.	
Physico-chemistry	**Between class deterioration:** Long term impact on transparency, temperature, oxygenation, salinity, nutrient concentrations or concentrations of specific pollutants that	Qualitative assessment based on predicted changes to physico-chemical quality elements.	Activity causes between-class deterioration in the thresholds provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.	Potentially non-compliant: appropriate mitigation options to be considered to reduce the impact to a lower deterioration category. For parameters	If mitigation cannot be put in place to reduce the impact to a lower deterioration category, activity will be considered to be non-compliant and an Article 4.7 assessment will be

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	is sufficient to decrease the overall status classification of the water body.			without thresholds (such as temperature) and impact on ecology not identified, compliant and no action required.	required.
	Within class deterioration: Long term impact on transparency, temperature, oxygenation, salinity, nutrient concentrations or concentrations of specific pollutants that is not sufficient to decrease the overall status classification of the water body.	Qualitative assessment based on predicted changes to physico-chemical quality elements.	Activity causes within-class deterioration in the thresholds provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.	Deterioration within class should be reduced as far as possible with mitigation. If deterioration is still likely after all mitigation has been included, monitoring is likely to be required to demonstrate compliance. If impact on ecology not identified for parameters without thresholds, compliant and no action required.	An Article 4.7 assessment may be required where good status is prevented from being achieved or water body objectives are undermined.

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	Temporary or no deterioration: Short term impact or no impact on transparency, temperature, oxygenation, salinity, nutrient concentrations or concentrations of specific pollutants, which will fully recover once the pressure is removed. OR any impacts on transparency, temperature, oxygenation, salinity, nutrient concentrations or concentrations of specific pollutants are very spatially constrained.	Qualitative assessment based on predicted changes to physico-chemical quality elements.	Activity does not cause deterioration in the thresholds for physico-chemistry provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. OR Any impact is temporally constrained and insufficient to impact upon biological quality elements. OR Any impact is spatially constrained and insufficient to impact upon biological quality elements.	Compliant: no further action required.	
Chemical status					
Priority substances	**Between class deterioration:** Long term impact on concentrations of priority substances	Qualitative assessment based on predicted changes to chemical quality elements. Water quality modelling of	Activity causes concentrations to exceed the EQS provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.	Potentially non-compliant: appropriate mitigation options to be considered	If mitigation cannot be put in place to reduce the impact to a lower deterioration

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	that is sufficient to decrease the overall status classification of the water body.	discharges will consider baseline environment and risk of exceeding EQS over long periods.		to reduce the impact to a lower deterioration category.	category, the activity will be considered to be non-compliant and an Article 4.7 assessment will be required.
	Within class deterioration: Long term impact on concentrations of priority substances that is not sufficient to decrease the overall status classification of the water body.	Qualitative assessment based on predicted changes to chemical quality elements. Water quality modelling of discharges will consider baseline environment.	*Baseline concentrations below EQS:* Activity causes concentrations to increase without exceeding the EQS provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. *Baseline concentrations above EQS:* Activity causes concentrations that already exceed the EQS provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 to increase further.	Deterioration within class should be reduced as far as possible with mitigation. If deterioration is still likely after all mitigation has been included, monitoring is likely to be required to demonstrate compliance.	An Article 4.7 assessment may be required where good status is prevented from being achieved or water body objectives are undermined.
	Temporary or no deterioration: Short term impact or no impact on concentrations of priority substances, which will fully recover once the pressure is removed.	Qualitative assessment based on predicted changes to chemical quality elements using an expert judgement approach.	Activity does not cause deterioration in the thresholds for priority substances provided in the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. OR Any impact is temporally constrained and insufficient to impact upon biological quality elements.	Compliant: no further action required.	

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	OR any impacts on concentrations of priority substances are very spatially constrained.		OR Any impact is spatially constrained and insufficient to impact upon biological quality elements.		
Protected Areas					
Shellfish/bathing water standards	Will be considered using the relevant standards as part of the WFD compliance assessment.				
Habitats Directive	Will be considered within the HRA and therefore no additional requirements for WFD compliance assessment.				
Nutrient sensitive sites	Will be considered within the EIA and therefore unlikely to be addition requirements for WFD compliance assessment if no impacts or minor impacts identified.				

Assessment of status deterioration in groundwater bodies

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
Groundwater quantity	**Between class deterioration:** Long term impact on groundwater levels, groundwater dependent surface water bodies or groundwater dependent terrestrial ecosystems that is sufficient to decrease the overall status classification of the water body.	Assessment of changes to groundwater quantity receptors based on interpretation of the results of the FEFLOW-MIKE11 model of groundwater and groundwater surface water interactions within the model domain, and qualitative extrapolation of these results beyond if necessary. Additional qualitative assessment of changes to key species for impacts on terrestrial ecosystems.	Activity results in a significant upward trend in salinity or indicators of other intrusions of pollutants that is sufficient to require any abstracted water to be treated. OR Activity prevents surface water bodies with ≥ 50% groundwater-derived flows from reaching target status over 20% of the groundwater body. OR Activity results in significant change to groundwater dependent terrestrial ecosystems as a result of reduced water availability. OR Activity results in abstraction that exceeds the available water resources in the groundwater body and supported surface flows.	Potentially non-compliant: appropriate mitigation options to be considered to reduce the impact to a lower deterioration category.	If mitigation cannot be put in place to reduce the impact to a lower deterioration category, the activity will be considered to be non-compliant and an Article 4.7 assessment will be required.
	Within class deterioration: Long term impact on groundwater levels, groundwater dependent surface water bodies or groundwater dependent terrestrial ecosystems that is not sufficient to decrease the overall status classification		Activity causes concentrations of substances that are indicative of saline intrusion or other intrusions of pollutants to exceed the thresholds provided in Schedule 5 of the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. OR Activity results in changes to groundwater levels that are identified as a potential contributor factor to unsatisfactory flow conditions in an associated surface water body. OR Activity results in changes to groundwater levels that are identified as a potential	Deterioration within class should be reduced as far as possible with mitigation. If deterioration is still likely after all mitigation has been included, monitoring is likely to be required to demonstrate compliance.	An Article 4.7 assessment may be required where good status is prevented from being achieved or water body objectives are undermined.

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	of the water body.		contributor to unsatisfactory conditions in a groundwater dependent terrestrial ecosystem. OR The quantity of groundwater abstracted from the water body as a result of the activity exceeds the long-term annual average rate of overall recharge.		
	Temporary or no deterioration: Short term impact or no impact on groundwater levels, groundwater dependent surface water bodies or groundwater dependent terrestrial ecosystems, which will fully recover once the pressure is removed. OR any impacts on groundwater levels, groundwater dependent surface water bodies or groundwater dependent terrestrial ecosystems are very spatially constrained.		Activity does not cause concentrations of substances indicative of saline intrusion or other intrusions of pollutants to exceed the thresholds provided in Schedule 5 of the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. OR Any impact is temporally constrained and insufficient to impact upon surface water bodies or groundwater dependent terrestrial ecosystems. OR Any impact is spatially constrained and insufficient to impact upon surface water bodies or groundwater dependent terrestrial ecosystems.	Compliant: no action required.	

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
Groundwater quality	**Between class deterioration:** Long term impact on conductivity, oxygenation, pH, concentrations of nitrates, ammonia and priority substances, drinking water quality and groundwater dependent terrestrial ecosystems that is sufficient to decrease the overall status classification of the water body.	Changes to water quality resulting from changes to the quantity will be assessed based on interpretation of the results of the FEFLOW-MIKE11 model within the model domain, and qualitative extrapolation of these results beyond. Where changes to water quality could result from additional input of contaminant, the assessment will take a tiered approach. The first tier will consider the dilution of the contaminant within the aquifer. The second tier (if necessary) will also consider attenuation within the unsaturated zone (if applicable). The third tier (if necessary) will also consider attenuation within the groundwater body (including the hyporheic zone if	Activity results in a significant upward trend in salinity or indicators of other intrusions of pollutants that is sufficient to require any abstracted water to be treated. OR Activity causes pollutant concentrations that result in failure of a surface water body to meet good status, with inputs from the groundwater accounting for ≥ 50% of the relevant surface water standard. OR Activity releases pollutants that result in significant change to groundwater dependent terrestrial ecosystems as a result of groundwater pollution. OR Activity results in deterioration in the quality of water within a drinking water protected area that is sufficient to require additional treatment. OR Activity results in pollutant concentrations that exceed the thresholds provided in Schedule 5 of the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 at all representative monitoring points, and the concentration of the pollutant exceeds the maximum allowable concentration for drinking water in at least one sample from a representative monitoring point.	Potentially non-compliant: appropriate mitigation options to be considered to reduce the impact to a lower deterioration category.	If mitigation cannot be put in place to reduce the impact to a lower deterioration category, the activity will be considered to be non-compliant. If changes to water quality result from change to the quantity, an Article 4.7 assessment will be required.
	Within class		Activity causes concentrations of substances that	Deterioration	An Article 4.7

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
	deterioration: Long term impact on conductivity, oxygenation, pH, concentrations of nitrates, ammonia and priority substances, drinking water quality and groundwater dependent terrestrial ecosystems that is not sufficient to decrease the overall status classification of the water body.	relevant).	are indicative of saline intrusion or other intrusions of pollutants to exceed the thresholds provided in Schedule 5 of the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. OR Activity causes the groundwater body to exceed a threshold value in Schedule 5 of the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 which is indicative of a risk to the ecological or chemical quality of an associated surface water body. OR Activity results in groundwater pollution that is identified as a potential contributor to unsatisfactory conditions in a groundwater dependent terrestrial ecosystem, and causes a threshold value in Schedule 5 of the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 that is indicative of the risks to the ecological quality of the ecosystem to be exceeded. OR Activity results in the quality of abstracted water to exceed a threshold value in Schedule 5 of the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015, causing a risk of deterioration in water intended for human consumption or significant impairment of water abstracted for	within class should be reduced as far as possible with mitigation. If deterioration is still likely after all mitigation has been included, monitoring is likely to be required to demonstrate compliance.	assessment may be required where good status is prevented from being achieved or water body objectives are undermined due to changes in quantity.

Parameter	Type of deterioration	Assessment methodology	Assessment criteria	Compliance	Assessment summary
			other uses.		
	Temporary or no deterioration: Short term impact or no impact on conductivity, oxygenation, pH, concentrations of nitrates, ammonia and priority substances, drinking water quality and groundwater dependent terrestrial ecosystems, which will fully recover once the pressure is removed. OR any impacts on conductivity, oxygenation, pH, concentrations of nitrates, ammonia and priority substances, and groundwater dependent terrestrial ecosystems are very spatially constrained.		Activity does not cause concentrations of substances indicative of saline intrusion or other intrusions of pollutants to exceed the thresholds provided in Schedule 5 of the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. OR Any impact is temporally constrained and insufficient to impact upon surface water bodies or groundwater dependent terrestrial ecosystems. OR Any impact is spatially constrained and insufficient to impact upon surface water bodies or groundwater dependent terrestrial ecosystems.	Compliant: no action required.	

Annex 20.2.3 Norfolk East coastal water body assessment of impacts

Please note that the impact assessment of the Norfolk East coastal water body has been undertaken using the Environment Agency's impact assessment template, obtained from https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters (Environment Agency, 2016f). Three pro formas are provided for the following impacts:

- Landfall
- Installation of the offshore export cables
- Presence of offshore cable protection

Figures

Figure 20.2.1 Export cable corridor and landfall within the WFD water body

Figure 20.2.2 Habitats in the vicinity of the export cable corridor and landfall

Figure 20.2.3 Export cable corridor and landfall against the WFD water body and its Protected Areas within 2km buffer zone

Activity: CONSTRUCTION PHASE -LANDFALL

Your activity	Description, notes or more information
Applicant name	Norfolk Vanguard Limited
Name of activity	Construction and operation activities related to the marine activities associated with the North Vanguard Offshore Wind Farm project. The activity considered in this assessment is 'Landfall'
Brief description of activity	The offshore cable will make landfall at Happisburgh South. Cable ducts would be installed at the landfall so that the ends of the offshore cables can be pulled through from the landward side. A Horizontal Directional Drilling (HDD) technique will be used to install cable. The HDD will exit in the subtidal zone beyond -5.5m LAT (within approximately 1km of the onshore drilling location). Cable burial will be undertaken from the HDD exit point. The worst case number of drills would be three (two ducts required for the export cables and a contingency drill in the unlikely event of a failure). Once the cable is pulled through the landfall ducts, the exposed offshore end is allowed to sink to the seabed and subsequently buried (e.g. using a back-hoe excavator) seaward of the HDD exit point. The trench would then be backfilled using the excavated material.
Location of activity (central point XY coordinates or national grid reference)	The identified landfall area is shown in Figure 20.2.1.
Footprint of activity (km^2)	Figure 20.2.1 shows the outline area in which the landfall will be sited. The actual works within the coastal water body will cover a much smaller area (i.e. the area associated with exiting of the drill and duct) for each of the cables.
Timings of activity (including start and finish dates)	It is expected that landfall HDD works would take up to 20 weeks– note that this timescale accounts for all landside works. The time taken for works within marine

	environment will be significantly less. Cable pull-through will be undertaken during cable laying works, subsequent to the duct installation. Cable pull through may be undertaken in one or two phases in line with the build out programme adopted for the offshore wind farm.
Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	See information above. Scale of works over a very small area and likely to be short timescales for works in the marine environment. Once completed, no further activity is required and all cables will be below seabed level.
Use or release of chemicals (state which ones)	Drilling fluid (a combination of water and natural clays such as bentonite) will be employed to lubricate the drilling process and cool the drill head. Fluid pressures will be monitored throughout the process to minimise the potential for breakout of the drilling fluid. An action plan will be developed and procedures adopted during the drilling activity to respond to any drilling fluid breakout.

Water body	**Description, notes or more information**
WFD water body name	*Norfolk East*
Water body ID	*GB650503520003*
River basin district name	*Anglian – Anglian TraC – Norfolk East TraC*
Water body type (estuarine or coastal)	*Coastal*
Water body total area (ha)	*21116.77*
Overall water body status (2015)	*Moderate*
Ecological status	*Moderate*
Chemical status	*Good*

Target water body status and deadline	*Moderate by 2015*
Hydromorphology status of water body	*Not assessed*
Heavily modified water body and for what use	*Yes – Flood protection use, Coast protection use*
Higher sensitivity habitats present	*Chalk reef; polychaete reef*
Lower sensitivity habitats present	*Cobbles, gravel and shingle; Intertidal soft sediment; Subtidal soft sediments; Subtidal rocky reef*
Phytoplankton status	*Good*
History of harmful algae	*Not monitored*
WFD protected areas within 2km	*No – closest protected area is Sea Palling (Bathing Waters).*

Section 1: Hydromorphology

Consider if your activity:	Yes	No	Hydromorphology risk issue(s)
Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status		✓	The water body is not at high status.
Could significantly impact the hydromorphology of any water body		✓	No, the landfall will be a temporary effect and once complete, the project will not result in impact on the hydromorphology
Is in a water body that is heavily modified for the same use as your activity		✓	No – the water body is heavily modified for coastal and flood protection.

Section 2: Biology

Habitats

Consider if the footprint of your activity is:	Yes	No	Biology habitats risk issue(s)
0.5km^2 or larger			See Figure 20.2.1. No, the footprint of the activity will not be greater than 0.5km^2
1% or more of the water body's area			No, the area to be impacted will not be greater than 1% of the water body area – See Figure 20.2.1
Within 500m of any higher sensitivity habitat		✓	The landfall site is not located within 500m of a sensitive habitat (see Figure 20.2.2).
1% or more of any lower sensitivity habitat			No, the area to be affected is very small (landfall area is currently covers 200m^2 however the actual area affected will be much smaller) and therefore unlikely to represent 1% of more of the habitat in the water body in which it is located.

Fish

Consider if your activity:	Yes	No	Biology fish risk issue(s)
Is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary		✓	A localised increase in suspended sediment concentration may occur as a result of these works. However, due to the nature of the seabed material (sand and gravelly sand) this will be short lived and localised.
Could impact on normal fish behaviour like movement, migration or spawning		✓	As above – no further impact anticipated once cables have been installed.

(for example creating a physical barrier, noise, chemical change or a change in depth or flow)			
Could cause entrainment or impingement of fish		✓	No

Section 3: Water quality

Consider if your activity:	Yes	No	Water quality risk issue(s)
Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)		✓	A temporary, localised increase in suspended sediment concentration may occur as a result of these works. However, due to the nature of the seabed material (sand and gravelly sand) this will be short lived and localised.
Is in a water body with a phytoplankton status of moderate, poor or bad		✓	No – status is good
Is in a water body with a history of harmful algae		✓	No

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Yes	No	Water quality risk issue(s)
The chemicals are on the Environmental Quality Standards Directive (EQSD) list		✓	No
It disturbs sediment with contaminants above Cefas Action Level 1		✓	A benthic ecology site characterisation survey was conducted by Fugro between 30 October and 10 November 2016. This also took sediment samples from the offshore cable route to determine the potential risk of sediment contamination. The data illustrates that sediment contamination within the offshore cable

			corridor is low (i.e. below Cefas Action Level 1). The coarse grain nature of the sediment in the landfall area indicates a low risk of sediment contamination (finer grains carry a higher risk).

Section 4: WFD protected areas

Consider if your activity is:	Yes	No	Protected areas risk issue(s)
Within 2km of any WFD protected area		✓	*There are no protected areas within 2km of the proposed activity – see Figure 20.2.3*

Section 5: Invasive non-native species (INNS)

Consider if your activity could:	Yes	No	INNS risk issue(s)
Introduce or spread INNS		✓	The risk of introducing invasive species and proposed mitigation measures has been assessed within Chapter 10 Benthic and Intertidal Ecology of the ES. With mitigation measures in place, this risk is considered to be low.

Summary

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	No	No risks identified
Biology: habitats	No	
Biology: fish	No	
Water quality	No	
Protected areas	No	
Invasive non-native species	No	

Activity: INSTALLATION OF EXPORT CABLES

Your activity	Description, notes or more information
Applicant name	Norfolk Vanguard Limited
Name of activity	Construction and operation activities related to the marine activities associated with the North Vanguard Offshore Wind Farm. The activity considered in this assessment is 'installation of the offshore export cables'
Brief description of activity	Maximum offshore export cable trench length is 200km based on two trenches of approximately 100km from the offshore electrical platforms to the landfall (with paired cables in each trench). Pre-sweeping (dredging) of the offshore export cable route may be required for up to 2,400,000m^3 of dredged sediment, of which the following may be required: Up to 1,800,000m^3 for export cables within the offshore wind farm sites Up to 500,000m^3 pre-sweeping within the Haisborough, Hammond and Winterton SCI; and Up to 100,000m^3 in the rest of the offshore cable corridor (excluding the nearshore, within the 10m water depth contour, where no pre-sweeping is expected). Following pre-sweeping, trenching (e.g. by jetting or ploughing) would be required to bury the cables. Trench widths would be up to 10m per cable, with a disturbance width of 30m based on 10m of spoil either side of the trench as a result of ploughing (worst case scenario). The worst case average burial depth for the export cables would be 3m and therefore up to 3,000,000m^3 of sediment could potentially be disturbed. The length of the offshore export cables within the Norfolk East water body would be approximately 2 to 6km and there would be a maximum of two cable trenches. No pre-sweeping in this area is anticipated and so the footprint would be associated with trenching. The total footprint would be up to 0.36km^2 (based on a worst case scenario of

	two trenches of up to 6km within the water body and a disturbance width of 30m).
Location of activity (central point XY coordinates or national grid reference)	The area of the export cable corridor is shown in Figure 20.2.1 against the WFD water body outline (however the actual area affected by the installation of up to six cables will be much smaller, see above).
Footprint of activity (km^2)	The area of the cable corridor that lies within the WFD water body is 6.5km^2. See Figure 20.2.1. The total footprint of cable trenching would be up to 0.36km^2
Timings of activity (including start and finish dates)	Based on the slowest rate of installation and the length of cable in the WFD water body, it is anticipated that the cable installation works will take approximately two months in total to complete the installation of up to four cables (laid as pairs in two trenches) within the WFD water body. Cable installation may be undertaken in one or two phases in line with the build out programme adopted for the offshore wind farm.
Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	As above
Use or release of chemicals (state which ones)	None

Water body	**Description, notes or more information**
WFD water body name	*Norfolk East*
Water body ID	*GB650503520003*
River basin district name	*Anglian – Anglian TraC – Norfolk East TraC*
Water body type (estuarine or coastal)	*Coastal*
Water body total area (ha)	*21116.77*

Overall water body status (2015)	*Moderate*
Ecological status	*Moderate*
Chemical status	*Good*
Target water body status and deadline	*Moderate by 2015*
Hydromorphology status of water body	*Not assessed*
Heavily modified water body and for what use	*Yes – Flood protection use, Coast protection use*
Higher sensitivity habitats present	*Chalk reef; polychaete reef*
Lower sensitivity habitats present	*Cobbles, gravel and shingle; Subtidal soft sediments; Subtidal rocky reef*
Phytoplankton status	*Good*
History of harmful algae	*Not monitored*
WFD protected areas within 2km	*Yes. Sea Palling Bathing Water.*

Section 1: Hydromorphology

Consider if your activity:	Yes	No	Hydromorphology risk issue(s)
Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status		✓	*The water body is not at high status.*
Could significantly impact the hydromorphology of any water body		✓	*No, the cable installation will be a temporary effect with no risk to hydromorphology.*

Is in a water body that is heavily modified for the same use as your activity		✓	*No – the water body is heavily modified for coastal and flood protection.*

Section 2: Biology

Habitats

Consider if the footprint of your activity is:	Yes	No	Biology habitats risk issue(s)
0.5km^2 or larger	✓		The cable route covers an area of 6.5km^2 (see Figure 20.2.1). However the actual cable installation area will be much smaller once the actual route within the corridor is determined (worst case 0.36km^2). Using the dredge area calculation of multiplying the dredge area by 1.5, the activity could be greater than 0.5km^2
1% or more of the water body's area		✓	The activity would not be greater than 1% of the total water body area.
Within 500m of any higher sensitivity habitat		✓	See Figure 20.2.2. The cable route passes through two habitat types, both of which are considered to be of low sensitivity according to WFD terms used in guidance: Outcrop which is considered to be closest to rocky reef and biotope SS.SMx.CMx Circalittoral mixed sediment which is considered to be closest to cobbles, gravel and shingle. There are no higher sensitivity areas within 500m
1% or more of any lower sensitivity habitat	✓		There is a possibility that the activity could impact on 1% or more of the lower sensitivity habitat.

Fish

Consider if your activity:	Yes	No	Biology fish risk issue(s)
Is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary		✓	There could be a temporary effect associated with resuspension of sediment but since the activity will be short-lived, this effect will not last longer than several hours after cessation of the cable burial. ES Chapter 8 Marine Physical Processes considers the output of previous modelling studies and summaries the conclusions as follows: a. Sand-sized material (which represents the majority of the disturbed sediment) would settle out of suspension within less than 1km from the point of installation within the export cable corridor and persist in the water column for less than a few tens of minutes. b. Mud-sized material (which represents only a very small proportion of the disturbed sediment) would be advected a greater distance and persist in the water column for hours to a few days. c. In shallow water depths nearer to shore (less than 5m LAT) the potential for dispersion is more limited and therefore the concentrations are likely to be greater, approaching 400mg/l at their peak. However, these plumes would be localised to within less than 1km of the location of installation and would persist for no longer than a few hours. e. After 180 hours following cessation of installation activities any plume would have been fully dispersed.

Could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)		✓	As above
Could cause entrainment or impingement of fish		✓	No

Section 3: Water quality

Consider if your activity:	Yes	No	Water quality risk issue(s)
Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)		✓	See summary of conclusions outlined under Fish above.
Is in a water body with a phytoplankton status of moderate, poor or bad		✓	No – status is good
Is in a water body with a history of harmful algae		✓	No

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Yes	No	Water quality risk issue(s)

The chemicals are on the Environmental Quality Standards Directive (EQSD) list		✓	No chemicals to be released.
It disturbs sediment with contaminants above Cefas Action Level 1		✓	A benthic ecology site characterisation survey was conducted by Fugro between 30 October and 10 November 2016. This took sediment samples from the offshore cable corridor to determine the potential risk of sediment contamination. The data is presented in Chapter 9 Marine Sediment and Water Quality and illustrates that sediment contamination within the offshore cable corridor is low (i.e. below Cefas Action Level 1). As a result, impacts on chemical contaminant concentrations in the water are not anticipated.

Section 4: WFD protected areas

Consider if your activity is:	Yes	No	Protected areas risk issue(s)
Within 2km of any WFD protected area		✓	Sea Palling designated bathing water is located within 2km of the offshore cable corridor – see Figure 20.2.3. However, the potential effects on designated bathing waters have been considered as part of the ES – See Chapter 8: Marine Sediment and Water Quality which concluded there are unlikely to be any significant effects on this bathing water.

Section 5: Invasive non-native species (INNS)

Consider if your activity could:	Yes	No	INNS risk issue(s)
Introduce or spread INNS		✓	The risks of introducing invasive species and proposed mitigation measures have been assessed within Chapter 10 Benthic and Intertidal Ecology of the ES. With mitigation measures in place, this risk is considered to be low.

Summary

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	No	
Biology: habitats	Yes	Lower sensitivity habitats only
Biology: fish	No	
Water quality	No	
Protected areas	No	
Invasive non-native species	No	

Activity: OPERATIONAL PHASE - CABLE PROTECTION

Your activity	Description, notes or more information
Applicant name	Norfolk Vanguard Limited
Name of activity	Operational activities related to the marine activities associated with the North Vanguard Offshore Wind Farm project. The activity considered in this assessment is 'presence of offshore cable protection'
Brief description of activity	In some cases, normal subsea installation methods cannot be applied and it is necessary to use alternative methods to provide an adequate degree of protection for the cable. Details of some of the techniques employed are given below: • Rock placement involves the laying of rocks on top of the cable to provide protection which is effective on crossings and other areas requiring protection. • Concrete mattresses, which are prefabricated flexible concrete coverings that are laid on top of the cable, are an alternative to rock placement. The placement of mattresses is slow and as such is only be used for short spans. Grout or sand bags may be used as an alternative to concrete mattressing; this method is generally applied on smaller scale applications than concrete mattressing. • Frond mattresses can be used to provide protection by stimulating the settlement of sediment over the cable. This method develops a sandbank over time protecting the cable but is only suitable in certain water conditions. This method may be used in close proximity to offshore structures though experience has shown that storms can strip deposited materials from the frond. An example of a typical frond mattress can be found below. • Uraduct or similar, is effectively a protective shell which come in two halves and is fixed around the cable to provide mechanical protection. Uraduct is generally used for short spans at crossings or near offshore structures where there is a high risk from falling

	objects. Uraduct does not provide protection from damage due to fishing trawls or anchor drags.
Location of activity (central point XY coordinates or national grid reference)	Within the WFD water body, cable protection may be required at each of the landfall HDD exit points. This would entail one mattress (6m length x 3m width x 0.3m height) plus rock dumping (5m length x 5m width x 0.5m height) at each exit point for the two cable pairs = 36m^2
Footprint of activity (km^2)	0.00004km^2
Timings of activity (including start and finish dates)	Duration of wind farm operational period.
Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	As above. No discharges required.
Use or release of chemicals (state which ones)	None

Water body	**Description, notes or more information**
WFD water body name	*Norfolk East*
Water body ID	*GB650503520003*
River basin district name	*Anglian – Anglian TraC – Norfolk East TraC*
Water body type (estuarine or coastal)	*Coastal*
Water body total area (ha)	*21116.77*
Overall water body status (2015)	*Moderate*
Ecological status	*Moderate*

Chemical status	*Good*
Target water body status and deadline	*Moderate by 2015*
Hydromorphology status of water body	*Not assessed*
Heavily modified water body and for what use	*Yes – Flood protection use, Coast protection use*
Higher sensitivity habitats present	*Chalk reef; polychaete reef*
Lower sensitivity habitats present	*Cobbles, gravel and shingle; Subtidal soft sediments; Subtidal rocky reef*
Phytoplankton status	*Good*
History of harmful algae	*Not monitored*
WFD protected areas within 2km	*No*

Section 1: Hydromorphology

Consider if your activity:	Yes	No	Hydromorphology risk issue(s)
Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status		✓	The water body is not at high status.
Could significantly impact the hydromorphology of any water body		✓	The cable protection requirements within the WFD water body are over a very small area, associated with cable interface with the mouth of the landfall duct. Any changes to hydromorphology will therefore be very small and localised to the location of the protection.

Is in a water body that is heavily modified for the same use as your activity		✓	No – the water body is heavily modified for coastal and flood protection.

Section 2: Biology

Habitats

Consider if the footprint[4] of your activity is:	Yes	No	Biology habitats risk issue(s)
0.5km^2 or larger			No
1% or more of the water body's area			No
Within 500m of any higher sensitivity habitat		✓	No (see Landfall assessment)
1% or more of any lower sensitivity habitat			No

Fish

Consider if your activity:	Yes	No	Biology fish risk issue(s)
Is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary		✓	No
Could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)		✓	No

Could cause entrainment or impingement of fish		✓	No

Section 3: Water quality

Consider if your activity:	Yes	No	Water quality risk issue(s)
Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)		✓	The presence of cable protection will have no effect on water quality
Is in a water body with a phytoplankton status of moderate, poor or bad		✓	No – status is good
Is in a water body with a history of harmful algae		✓	No

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Yes	No	Water quality risk issue(s)
The chemicals are on the Environmental Quality Standards Directive (EQSD) list		✓	No chemicals to be released
It disturbs sediment with contaminants above Cefas Action Level 1		✓	Presence of cable protection will not release contamination into the water environment

Section 4: WFD protected areas

Consider if your activity is:	Yes	No	Protected areas risk issue(s)
Within 2km of any WFD protected area		✓	There are no protected areas within 2km of the proposed activity – see Figure 20.2.3

Section 5: Invasive non-native species (INNS)

Consider if your activity could:	Yes	No	INNS risk issue(s)
Introduce or spread INNS		✓	The presence of cable protection will not introduce or spread INNS

Summary

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	No	No risks identified
Biology: habitats	No	
Biology: fish	No	
Water quality	No	
Protected areas	No	
Invasive non-native species	No	

20.10.1.1 Annex 20.2.3 Figures

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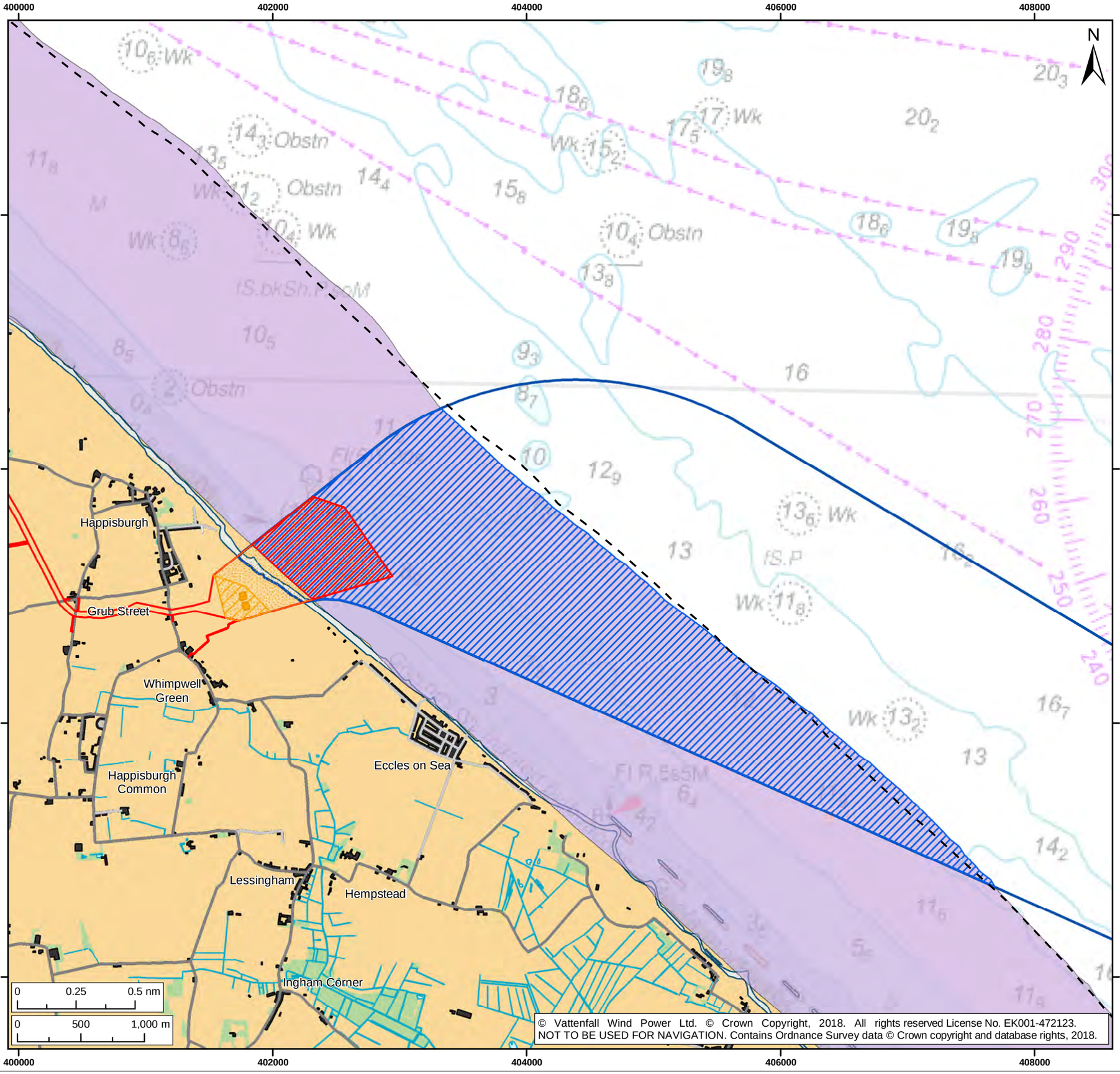

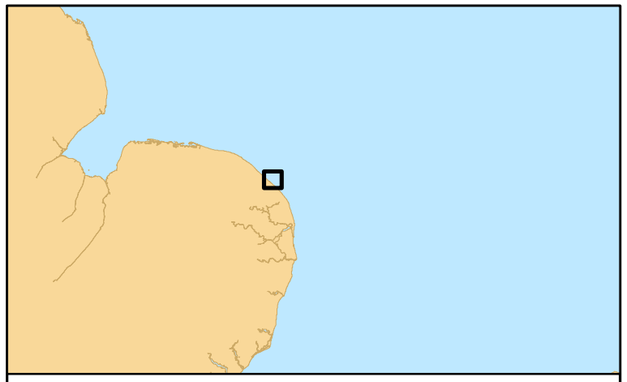

Legend:

- Offshore cable corridor
- Norfolk Vanguard onshore red line boundary

Landfall

- Landfall zone
- Landfall compound zone
- Indicative landfall compound
- 1nm Limit
- Norfolk East coastal water body[1]
- Area within water body (5.7km²)
- Landfall area within water body (0.49km²)

[1] Environment Agency, 2017.

Project:	Report:
Norfolk Vanguard	Norfolk East coastal water body assessment of impacts

Title: Export Cable Corridor and Landfall within WFD water body

Figure: 20.2.1 | Drawing No: PB4476-005-02023-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
05	16/05/2018	LB	CP	A3	1:30,000
04	20/04/2018	AB	CP	A3	1:30,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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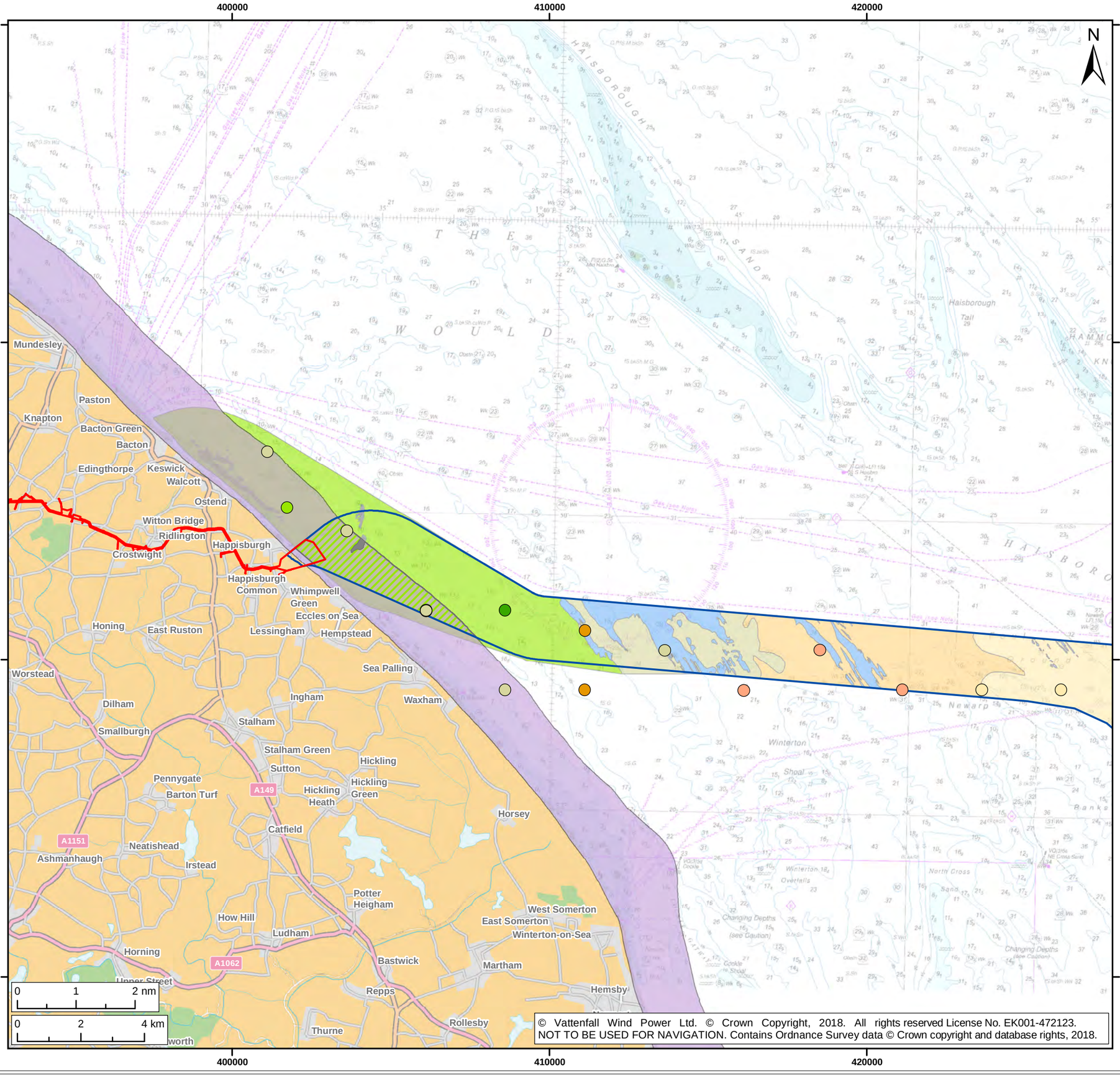

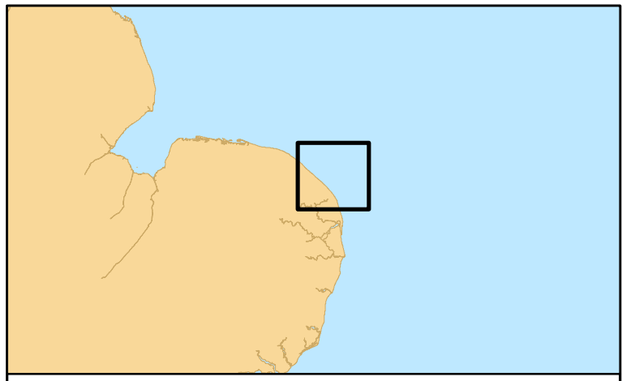

Legend:

- Offshore cable corridor
- Norfolk Vanguard onshore red line boundary
- Norfolk East coastal water body[1]

Biotope[2]

- SS.SCS.CCS
- SS.SCS.CCS.MedLumVen
- SS.SCS.CCS.Pken
- SS.SSa.CFiSa
- SS.SMX.CMx
- SS.SMX.CMx - SS.SBR.PoR.SspiMx - med reef
- No Data

Biotope interpretation[2]

- SS.SCS.CCS
- SS.SSa.CFiSa
- Potential SS.SCS.CCS.MedLumVen
- SS.SMx.CMx
- Potential SS.SBR.PoR.SspiMx
- Nearshore pitted seafloor
- Outcrop

Area of Biotope interpretation within Norfolk East coastal water body[2]

- SS.SMx.CMx (5.5km²)
- Outcrop (0.1km²)

[1] Environment Agency, 2017.
[2] Fugro Survey B.V, 2016.

Project:	Report:
Norfolk Vanguard	Norfolk East coastal water body assessment of impacts

Title:

Habitats in the vicinity of the Export Cable Corridor and Landfall

Figure: 20.2.2 | Drawing No: PB4476-005-02023-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
05	16/05/2018	LB	CP	A3	1:120,000
04	20/04/2018	AB	CP	A3	1:120,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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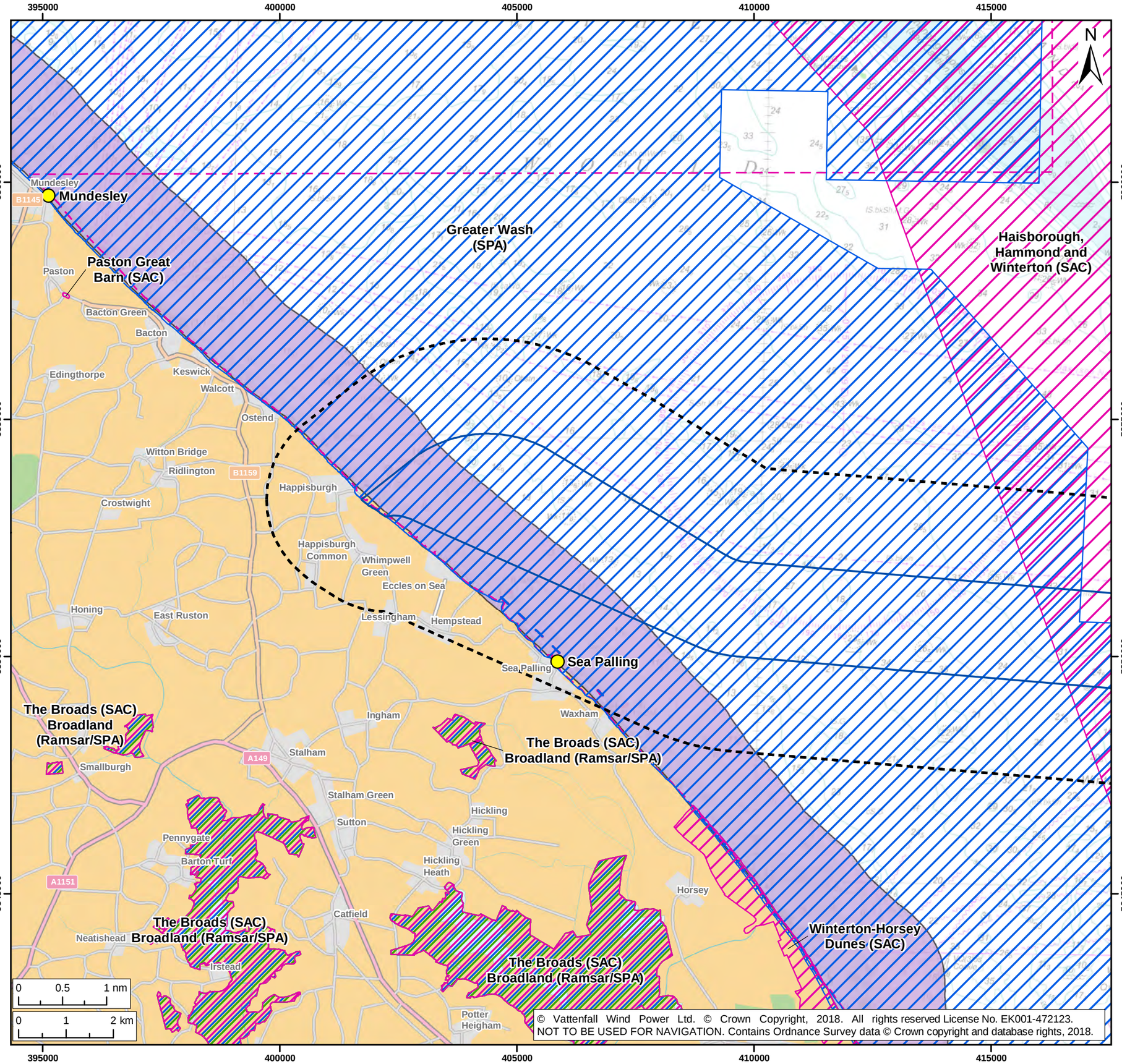

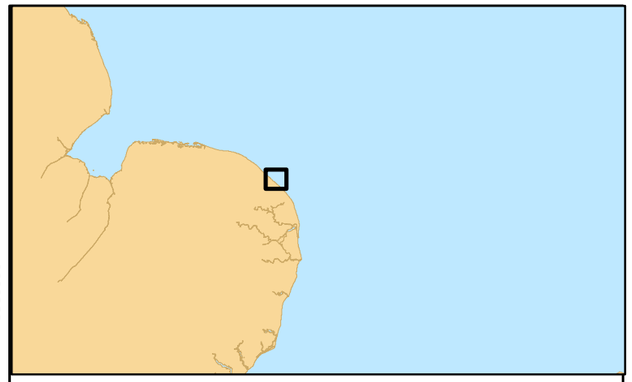

Legend:

- Offshore cable corridor
- 2km buffer zone
- Bathing Water monitoring location[1]
- Norfolk East coastal water body[1]
- Ramsar[2]
- Special Area of Conservation (SAC)[2]
- Candidate Special Area of Conservation (cSAC)[2]
- Special Protection Area (SPA)[2]

[1] Environment Agency, 2017.
[2] Natural England/JNCC, 2018.

Project:	Report:
Norfolk Vanguard	Norfolk East coastal water body assessment of impacts

Title:

Shows Export Cable Corridor and Landfall against the WFD water body and its Protected Areas within 2km buffer zone

Figure: 20.2.3 | Drawing No: PB4476-005-02023-003

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
06	31/05/2018	GC	CP	A3	1:80,000
05	16/05/2018	LB	CP	A3	1:80,000

Co-ordinate system: ETRS 1989 UTM Zone 31N **EPSG:** 25831

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