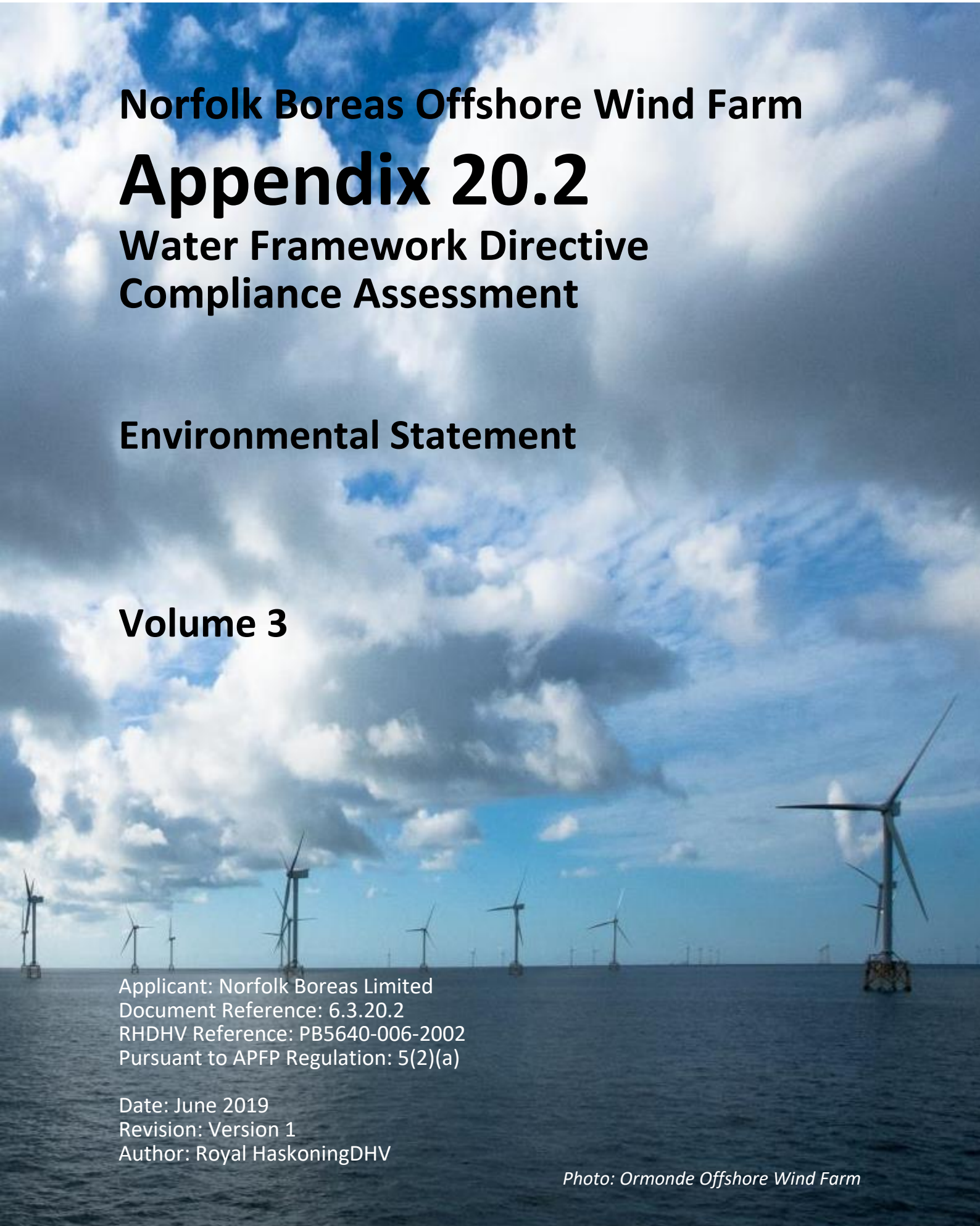
Norfolk Boreas Offshore Wind Farm

Appendix 20.2

Water Framework Directive Compliance Assessment

Environmental Statement

Volume 3



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Glossary of Acronyms

A/HMWB	Artificial or Heavily Modified Water Body
CIA	Cumulative Impact Assessment
CIRIA	Construction Industry Research and Information Association
CMS	Construction Method Statement
DCO	Development Consent Order
Defra	Department for Environment, Food & Rural Affairs
EC	European Commission
EIA	Environmental Impact Assessment
ES	Environmental Statement
EU	European Union
FRA	Flood Risk Assessment
GEP	Good Ecological Potential
GES	Good Ecological Status
HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IDB	Internal Drainage Board
NPPF	National Planning Policy Framework
NPS	National Policy Statement
PPG	Planning Practice Guidance
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SPZ	Source Protection Zone
SuDS	Sustainable Drainage System
WCS	Worst Case Scenario
WFD	Water Framework Directive

Glossary of Terminology

Cable pulling	Installation of cables within pre-installed ducts from jointing pits located along the onshore cable route.
Ducts	A duct is a length of underground piping, which is used to house electrical and communication cables.
Landfall	Where the offshore cables come ashore at Happisburgh South.
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.
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.
Necton National Grid substation	The grid connection location for Norfolk Boreas and Norfolk Vanguard

Onshore cable route	The up to 35m working width within a 45m wide corridor which will contain the buried export cables as well as the temporary running track, topsoil storage and excavated material during construction.
Onshore cables	The cables which take power and communications from landfall to the onshore project substation
Onshore project area	The area of the onshore infrastructure (landfall, onshore cable route, accesses, trenchless crossing zones and mobilisation areas; onshore project substation and extension to the Necton National Grid substation and overhead line modifications).
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 Boreas Limited
The project	Norfolk Boreas 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	Areas within the onshore cable route which will house trenchless crossing entry and exit points.
Workfront	A length of onshore cable route within which duct installation works will occur, approximately 150m.

1 Introduction

1. This assessment aims to determine whether the onshore activities associated with the proposed Norfolk Boreas 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. The objectives of this compliance assessment are to:

   - Identify water bodies that could potentially be affected by the onshore elements of the project;
   - Identify onshore activities that could affect these WFD water bodies;
   - Assess the potential for the proposed onshore 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.

3. This report is an appendix to Chapter 20 Water Resources and Flood Risk, and has been prepared as part of the Environmental Statement (ES). This assessment will consider two potential development scenarios.

4. Vattenfall Wind Power Limited (VWPL) (the parent company of Norfolk Boreas Limited) is also developing Norfolk Vanguard, a 'sister project' to Norfolk Boreas. In order to minimise impacts associated with onshore construction works for the two projects, Norfolk Vanguard are seeking to obtain consent to undertake enabling works for both projects at the same time. However, Norfolk Boreas needs to consider the possibility that Norfolk Vanguard may not proceed to construction.

5. The two alternative assessment scenarios considered in this report and subsequently in this WFD are therefore as follows:

   - **Scenario 1** – Norfolk Vanguard proceeds to construction and installs ducts and other shared enabling works for Norfolk Boreas.
   - **Scenario 2** – Norfolk Vanguard does not proceed to construction and Norfolk Boreas proceeds alone. Norfolk Boreas undertakes all works required as an independent project.

6. Note that potential impacts of offshore project activities are considered in a separate WFD Compliance Assessment found in Appendix 9.1 to Chapter 9 Marine Water and Sediment Quality of the ES.

1.1 The Water Framework Directive

1.1.1 Overview

7. The WFD is transposed into national law by means of the Water Environment (WFD) (England and Wales) Regulations 2017.

8. 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.

1.1.2 Surface waters

9. 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'.

10. The ecological status of a surface water body is assessed according to the condition of biological elements (e.g. fish, benthic invertebrates and other aquatic flora), the condition of supporting physico-chemical elements (e.g. thermal conditions, salinity, and concentrations of oxygen, ammonia and nutrients), concentrations of specific pollutants (e.g. copper and other priority substances), and the condition of the hydromorphological quality elements (e.g. morphological conditions and hydrological regime). Ecological status is recorded on the scale of high, good, moderate, poor or bad, with “High” denoting largely undisturbed conditions and the other classes representing increasing deviation from this natural condition; the target for all water bodies is Good Ecological Status (GES). The ecological status classification for the water body is determined from the worst scoring quality element, which means that the condition of a single quality element can cause a water body to fail to reach its WFD classification objectives.

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. 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.

13. 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.

1.1.3 Groundwater

14. 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). UKTAG[1] have provided guidance on how groundwater quantity and quality is assessed (UKTAG, 2012a; UKTAG, 2012b).

1.1.4 Roles and Responsibilities

15. 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.

16. 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.

1.1.5 Report Structure

17. This report is divided into seven sections:

- Section 1 (this section) describes the purpose of this report;
- Section 2 provides a brief overview of the project;
- Section 3 presents the WFD compliance assessment methodology that is used in this report;
- Section 4 presents the results of the screening exercise undertaken for Stage 1 of the WFD compliance assessment;
- Section 5 presents the results of the scoping exercise undertaken for Stage 2 of the WFD compliance assessment;

[1] UKTAG is a partnership of the UK environment and conservation agencies which was set up was created to provide coordinated advice on the science and technical aspects of the European Union's Water Framework Directive.

- Section 6 presents the results of the detailed assessment undertaken for Stage 3 of the WFD compliance assessment; and
- Section 7 presents a summary of mitigation, improvements and monitoring, which comprises Stage 4 of the WFD compliance assessment.

2 Onshore Project Description

2.1 Overview

18. The project includes both offshore and onshore elements. The offshore wind farm comprises of a 725km^2 area located approximately 72km from the Norfolk coastline within which wind turbines will be located. Norfolk Boreas will have a maximum installed capacity of 1,800 megawatts (MW). The offshore wind farm will be connected to the shore by offshore export cables installed within the offshore cable corridor. This assessment focusses only on the onshore project elements, for offshore please refer to the WFD Compliance Assessment found in Appendix 9.1 to Chapter 9 Marine Water and Sediment Quality of the ES.

19. The onshore project area comprises:

- Landfall;
- Onshore cable route;
- Onshore project substation (HVDC converter station); and
- Extension to the Necton National Grid substation and National Grid overhead line modifications.

20. Vattenfall Wind Power Limited (VWPL) (the parent company of Norfolk Boreas Limited) is also developing Norfolk Vanguard, a 'sister project' to Norfolk Boreas. Norfolk Vanguard is of the same capacity and would be located adjacent to the Norfolk Boreas site. Norfolk Vanguard's development schedule is approximately one year ahead of Norfolk Boreas and the Development Consent Order (DCO) application was submitted in June this year. As the two wind farms are located next to each other and both would connect to the Necton National Grid Substation, VWPL has adopted a strategic approach to planning infrastructure for the two projects with the aim of optimising overall design and reducing impacts where practical.

21. In order to minimise impacts associated with onshore construction works for the two projects, VWPL is aiming to carry out enabling works for both projects at the same time. As such Norfolk Vanguard Limited as part of their DCO application, are seeking to obtain consent to undertake some enabling works for Norfolk Boreas. These include:

- Installation of ducts to house the cables along the entirety of the onshore cable route from the landward side of the transition pit at the landfall to the onshore project substation;

- A47 junction works and installation of access road to onshore project substation; and
- National Grid overhead line modifications at the Necton National Grid substation for both projects.

2.2 Development Scenarios

22. If both projects proceed to construction, the enabling works described above will be provided for within the Norfolk Vanguard DCO. However, Norfolk Boreas needs to consider the possibility that the Norfolk Vanguard project may not proceed to construction.

23. The Environmental Impact Assessment (EIA) will therefore be undertaken using the following two alternative scenarios (further details are presented in Chapter 5 Project Description) and an assessment of potential impacts has been undertaken for each scenario:

- **Scenario 1** – Norfolk Vanguard proceeds to construction and installs ducts and other shared enabling works for Norfolk Boreas.
- **Scenario 2** – Norfolk Vanguard does not proceed to construction and Norfolk Boreas proceeds alone. Norfolk Boreas undertakes all works required as an independent project.

24. A detailed description of the two scenarios is provided in Chapter 5 Project Description.

3 Assessment Method

25. 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.

3.1 Overall Approach

26. 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. The following are considered to be the most relevant to the onshore elements of the project:

- 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; and
- Protecting and improving the water environment: WFD compliance of physical works in rivers (Environment Agency, 2016b) and associated supplementary guidance (Environment Agency, 2016c).

27. For the purposes of this assessment, the broad methodologies outlined in the guidance documents listed above have been brought together to develop an assessment methodology that can be used for 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 assessment and mitigation.

28. These stages are described in more detail in the subsequent sections. Note that each stage of the assessment process will consider both Scenario 1 and Scenario 2, as outlined in section 2.2 above.

3.2 Stage 1: Screening

29. This stage consists of an initial screening exercise 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.

3.3 Stage 2: Scoping

30. 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 for each water body and each activity. 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.

31. The 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.

32. 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.

3.4 Stage 3: Detailed Compliance Assessment

3.4.1 Overview of Method

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

3.4.2 Determination of Deterioration

34. There is currently no clear guidance from the Environment Agency on how deterioration in the status of water bodies should be assessed. The assessment therefore draws upon the following guidance documents:

- 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, 2016c). 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.

35. A detailed summary of the assessment criteria used for rivers and groundwater is provided in Annex 1. The assessment considers 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.

36. This assessment is informed by the data and assessments provided in the appropriate technical chapters of the ES (including Chapter 19 Ground Conditions and Contamination, Chapter 20 Water Resources and Flood Risk and Chapter 22 Onshore Ecology).

3.4.3 Article 4.7

37. 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.

3.5 Stage 4: Summary of Assessment and Mitigation Requirements

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

4 Stage 1: Screening

4.1 Purpose of this Section

39. 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.

4.2 Identification of Water Bodies

40. The water bodies that could potentially be affected by the project under both Scenario 1 and Scenario 2 (although the nature and scale of impacts could differ) have been identified using the method outlined in section 3, building upon:

- Details of the current onshore project proposals for each scenario; and
- The information included on water body extent in the Catchment Data Explorer (http://environment.data.gov.uk/catchment-planning).

41. Figures 20.2.1-20.2.3 show the WFD water bodies screened into the WFD compliance assessment under both Scenario 1 and Scenario 2. These water bodies are described below in Table 4.1. Protected areas that could potentially interact with the project are shown in Figure 20.2.4.

Table 4.1 WFD water bodies screened into the WFD compliance assessment (Scenario 1 and Scenario 2)

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.

Water body name and WFD reference	Water body type	Status and comments
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) (GB105034055690)	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.
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

Water body name and WFD reference	Water body type	Status and comments
		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 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.

42. Baseline data for each of the water bodies were 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 the 'Cycle 2 Extended Water Body Summary Report' produced for each water body by the Environment Agency (Environment Agency, 2016d).

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

4.3 Potential Impacts of the Project

43. 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 4.2 and Table 4.3 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 under both Scenario 1 and Scenario 2. It should be noted that these impact mechanisms are theoretical and do not necessarily indicate that an effect is likely to occur, nor is the list intended to be exhaustive.

44. 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 4.2 List of project activities and potential impact mechanisms during construction

Activity	Potential mechanisms for impact on WFD quality elements
Scenario 1	
Cable pulling, installation of joint pits, reinstatement of running track and construction of onshore project substation and National Grid substation extension	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).
Temporary watercourse crossings (e.g. culverts) along the running track	Direct changes to bed and bank habitats (hydromorphology, biology). Changes to surface water hydrology and sediment conveyance, with the potential for hydromorphological adjustment (hydromorphology). Changes in water quality associated with leakage or accidental spills of fuels, oils, lubricants and construction materials (physico-chemistry and priority substances).

Activity	Potential mechanisms for impact on WFD quality elements
	Hydromorphological and physico-chemical changes could have direct effects on biological elements.
Scenario 2	
Site preparation, construction of running track and earthworks and other construction activities associated with the cable route (including the installation of 1.5m deep cable ducts), onshore project substation and National Grid substation extension	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 techniques (e.g. temporary dam and divert and temporary and permanent culverts)	Direct changes to bed and bank habitats (hydromorphology, biology). Changes to surface water hydrology and sediment conveyance, with the potential for hydromorphological adjustment (hydromorphology). 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.

Table 4.3 List of project activities and potential impact mechanisms during operation

Activity	Potential mechanisms for impact on WFD quality elements
Scenario 1 and Scenario 2	
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

Activity	Potential mechanisms for impact on WFD quality elements
	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 permanent infrastructure along the cable route (e.g. joint bays and watercourse crossings) and at the onshore project substation and National Grid connection	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 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.

4.4 Results of Initial Screening of Water Bodies

45. A screening exercise has been undertaken to identify which of the water bodies described in section 4.2 (Figures 20.2.1 – 20.2.3) have the potential to be impacted by the activities described in section 4.3. The results of this exercise are shown in Table 4.4.

46. 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);
    - Wendling Beck (GB105034051020); and

- Wissey - Upper (GB105033047890.

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

47. Table 4.4 also demonstrates that there are no project activities that could potentially impact upon the following water bodies, and are therefore screened out of further consideration in the Stage 2 scoping assessment:

- River water bodies:
  - Scarrow Beck (GB105034055740);
  - Bure (u/s confluence with Scarrow Beck) (GB105034055690);
  - Bure (Horstead Mill to St Benet's Abbey (GB105034050931);
  - Wensum (to Tatterford) (GB105034051111);
  - Wensum DS Norwich (GB105034055882);
  - Blackwater (Wendling Beck) (GB105034051050);
  - Foulsham Tributary (GB105034055850);
  - Little Ryburgh Tributary (GB105034055860); and
  - Nar Upstream of Abbey Farm (GB105033047791).

- Groundwater bodies:
  - North West Norfolk Chalk (GB40501G400200).

Table 4.4 Results of screening exercise

Water body name and ID number	Type	Screened in (Scenario 1)	Screened in (Scenario 2)	Justification
East Ruston Stream (GB105034055670)	River	Yes	Yes	Scenario 1: Screened in because the activities proposed within the catchment of this water body (including cable pulling, joint pit excavation and temporary watercourse crossings) could potentially impact upon water body status. Scenario 2: 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	Yes	Scenario 1: Screened in because the activities proposed within the catchment of this water body (including cable pulling, joint pit excavation and temporary watercourse crossings) could potentially impact upon water body status. Scenario 2: 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.
North Walsham and Dilham Canal (disused) (GB105034055710)	River	Yes	Yes	Scenario 1: Screened in because the activities proposed within the catchment of this water body (including cable pulling, joint pit excavation and temporary watercourse crossings) could potentially impact upon water body status. Scenario 2: 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.
King's Beck (GB105034055730)	River	Yes	Yes	Scenario 1: Screened in because the activities proposed within the catchment of this water body (including cable pulling, joint pit excavation and temporary watercourse crossings) could potentially impact upon water body status. Scenario 2: 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.

Water body name and ID number	Type	Screened in (Scenario 1)	Screened in (Scenario 2)	Justification
Bure (Scarrow Beck to Horstead Mill) (GB105034050932)	River	Yes	Yes	Scenario 1: Screened in because the activities proposed within the catchment of this water body (including cable pulling, joint pit excavation and temporary watercourse crossings) could potentially impact upon water body status. Scenario 2: 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.
Mermaid Stream (GB105034050900)	River	Yes	Yes	Scenario 1: Screened in because the activities proposed within the catchment of this water body (including cable pulling, joint pit excavation and temporary watercourse crossings) could potentially impact upon water body status. Scenario 2: 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.
Wensum US Norwich (GB105034055881)	River	Yes	Yes	Scenario 1: Screened in because the activities proposed within the catchment of this water body (including cable pulling, joint pit excavation and temporary watercourse crossings) could potentially impact upon water body status. Scenario 2: 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.
Blackwater Drain (Wensum) (GB105034051120)	River	Yes	Yes	Scenario 1: Screened in because the activities proposed within the catchment of this water body (including cable pulling, joint pit excavation and temporary watercourse crossings) could potentially impact upon water body status. Scenario 2: 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.

Water body name and ID number	Type	Screened in (Scenario 1)	Screened in (Scenario 2)	Justification
Wendling Beck (GB105034051020)	River	Yes	Yes	Scenario 1: Screened in because the activities proposed within the catchment of this water body (including cable pulling, joint pit excavation and temporary watercourse crossings) could potentially impact upon water body status. Scenario 2: 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	Yes	Scenario 1 and Scenario 2: Screened in because the activities proposed within the catchment of this water body (including substation infrastructure development and watercourse crossings using trenched techniques) could potentially impact upon water body status.
Scarrow Beck (GB105034055740)	River	No	No	Scenario 1 and Scenario 2: Screened out because this water body catchment is approximately 2.7km upstream of the proposed project and no mechanism for potential impacts to propagate upstream of the water body in which they take place has been identified.
Bure (u/s confluence with Scarrow Beck) (GB105034055690)	River	No	No	Scenario 1 and Scenario 2: Screened out because this water body catchment is approximately 2.7km upstream of the proposed project and no mechanism for potential impacts to propagate upstream of the water body in which they take place has been identified.
Bure (Horstead Mill to St Benet's Abbey (GB105034050931)	River	No	No	Scenario 1 and Scenario 2: Screened out because this water body catchment is approximately 15.2km downstream of the proposed project and no mechanism for potential impacts to propagate downstream of the water body in which they take place has been identified.
Wensum (to Tatterford) (GB105034051111)	River	No	No	Scenario 1 and Scenario 2: Screened out because this water body catchment is approximately 28.8km upstream of the proposed project and no mechanism for potential impacts to propagate upstream of the water body in which they take place has been identified.

Water body name and ID number	Type	Screened in (Scenario 1)	Screened in (Scenario 2)	Justification
Wensum DS Norwich (GB105034055882)	River	No	No	Scenario 1 and Scenario 2: Screened out because this water body catchment is approximately 29.7km downstream of the proposed project and no mechanism for potential impacts to propagate downstream of the water body in which they take place has been identified.
Blackwater (Wendling Beck) (GB105034051050)	River	No	No	Scenario 1 and Scenario 2: Screened out because this water body catchment is approximately 7.5km upstream of the proposed project and no mechanism for potential impacts to propagate upstream of the water body in which they take place has been identified.
Foulsham Tributary (GB105034055850)	River	No	No	Scenario 1 and Scenario 2: Screened out because this water body catchment is approximately 12.7km upstream of the proposed project and no mechanism for potential impacts to propagate upstream of the water body in which they take place has been identified.
Little Ryburgh Tributary (GB105034055860)	River	No	No	Scenario 1 and Scenario 2: Screened out because this water body catchment is approximately 19.5km upstream of the proposed project and no mechanism for potential impacts to propagate upstream of the water body in which they take place has been identified.
Nar Upstream of Abbey Farm (GB105033047791)	River	No	No	Scenario 1 and Scenario 2: Screened out because no project activities will be undertaken within this water body catchment or that of any connected water bodies.
Broadland Rivers Chalk & Crag (GB40501G400300)	Groundwater	Yes	Yes	Scenario 1: Screened in because the activities proposed within this water body (including cable pulling and joint pit excavation) could potentially impact upon water body status. Scenario 2: Screened in because the activities proposed within this water body (including excavations for cable duct installation and construction of joint pits) could potentially impact upon water body status.
Cam and Ely Ouse Chalk (GB40501G400500)	Groundwater	Yes	Yes	Scenario 1: Screened in because the activities proposed within this water body (including cable pulling and joint pit excavation) could potentially impact upon water body status.

Water body name and ID number	Type	Screened in (Scenario 1)	Screened in (Scenario 2)	Justification
				Scenario 2: Screened in because the activities proposed within this water body (including excavations for cable duct installation and construction of joint pits) could potentially impact upon water body status.
North Norfolk Chalk (GB40501G400100)	Groundwater	Yes	Yes	Scenario 1: Screened in because the activities proposed within this water body (including cable pulling and construction of the onshore project substation and Necton National Grid extension) could potentially impact upon water body status. Scenario 2: Screened in because the activities proposed within this water body (including excavations for cable duct installation, construction of joint pits and construction of the onshore project substation and Necton National Grid extension) could potentially impact upon water body status.
North West Norfolk Chalk (GB40501G400200)	Groundwater	No	No	Scenario 1 and Scenario 2: Screened out because no project activities will be undertaken within this water body.

5 Stage 2: Scoping

5.1 Purpose of this Section

48. This section presents the results of the scoping assessment undertaken on the water bodies identified in section 4.4 of this report, using the method outlined in section 3.3.

49. This assessment examines the potential for activities associated with the project to impact upon WFD quality elements and overall water body status under both scenarios. 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).

50. The scoping assessment was undertaken for the water bodies identified at the outcome of Stage 1, as detailed in section 4.4:

- 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);
- Broadland Rivers Chalk & Crag (GB40501G400300);
- Cam and Ely Ouse Chalk (GB40501G400500); and
- North Norfolk Chalk (GB40501G400100).

5.2 Construction Impacts

5.2.1 Construction Activities at the Onshore Substations and along the Cable Route

51. Onshore construction activities under Scenario 1 and Scenario 2 have the potential to impact upon the hydromorphology, physico-chemistry and biology of the water bodies in which these activities will take place (Table 5.1). This considers all construction activities that will take place within the water body catchments, excluding water crossings. These are considered separately in Section 5.2.2.

52. There is potential for impacts on the hydromorphology (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 construction of the onshore project substation and National Grid extension. 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 (including the running track) and onshore project substation sites by surface runoff, which could impact upon the hydromorphology of the river water bodies.

53. There is potential for impacts on the physico-chemistry (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.

54. There is potential for impacts on the biology (aquatic flora, benthic invertebrate fauna and fish fauna) of the river water bodies as a result of the potential changes to hydromorphology and physico-chemistry described above.

55. Construction activities under Scenario 1 and Scenario 2 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.

56. Table 5.2 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 5.1 Onshore construction activities: Scoping questions for river water bodies (Scenarios 1 and 2)

Parameter	Scoping question	Answer	Applicable 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
		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

Parameter	Scoping question	Answer	Applicable water bodies
			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 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)

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

Table 5.2 Onshore construction activities: Scoping questions for groundwater bodies (Scenarios 1 and 2)

Parameter	Scoping question	Answer	Applicable water bodies
Groundwater quantity	Could 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
	Could the activity lead to saline intrusion?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Could 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
	Could 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
	Could 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	Could 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
	Could 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
	Could the activity lead to saline intrusion?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Could 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
		Yes	-

Parameter	Scoping question	Answer	Applicable water bodies
	Could 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?	No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Could 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

5.2.2 Watercourse crossings

57. The onshore running track (Scenario 1 and Scenario 2) and cable route (Scenario 2 only) 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 watercourse crossings are required (Table 4.2).

58. There is potential for watercourse crossings to impact upon on the hydromorphology (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 through the installation of temporary culverts (Scenarios 1 and 2) and the use of damming and diverting techniques for open trenching or installation of permanent culverts that will cause localised disruption to the bed and banks (Scenario 2).
- Reduction in flow and sediment conveyance, creation of upstream impoundment, and encouragement of fine sedimentation as a result of temporary dams and culverts installed along the running track (Scenario 1 and 2) or during trenching (Scenario 2). Any in-channel structures 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 culverts (Scenario 1 and 2) or dams and culverts (Scenario 2) while the water bodies are being crossed. This could impact upon the hydrology of the surface water system, change patterns of erosion and sedimentation, and impede river continuity.

59. There is potential for impacts on the physico-chemistry (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 under both scenarios, which could impact upon surface water quality.

60. There is potential for impacts on biological 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.

61. Watercourse crossings under Scenario 1 and Scenario 2 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.

62. 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.

63. Table 5.4 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 5.3 Watercourse crossings: Scoping questions for river water bodies (Scenarios 1 and 2)

Parameter	Scoping question	Answer	Applicable 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-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 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
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
		Yes	East Ruston Stream

Parameter	Scoping question	Answer	Applicable water bodies
Morphological conditions	Could the activity change the width, depth, bank conditions, bed substrates and structure of the riparian zone?		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
		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

Parameter	Scoping question	Answer	Applicable water bodies
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 5.4 Watercourse crossings: Scoping questions for groundwater bodies (Scenarios 1 and 2)

Parameter	Scoping question	Answer	Applicable water bodies
Groundwater quantity	Could 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
	Could the activity lead to saline intrusion?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Could 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
	Could 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
	Could the activity result in additional abstraction that will exceed any	Yes	-
		No	Broadland Rivers Chalk & Crag

Parameter	Scoping question	Answer	Applicable water bodies
	groundwater body scale headroom between the Fully licensed quantity and the limit imposed by the total recharge?		Cam and Ely Ouse Chalk North Norfolk Chalk
	Could 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	Could 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
	Could 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
	Could the activity lead to saline intrusion?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Could 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
	Could 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
	Could 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

5.3 Operation Impacts

5.3.1 Operation and maintenance of permanent infrastructure

64. The permanent presence and maintenance (scheduled and unplanned) of project infrastructure (including installed cables, any permanent watercourse crossings and the onshore project substation) under both Scenario 1 and Scenario 2 has the

potential to impact upon the hydromorphology, physico-chemistry and biology of the water bodies in which these activities will take place (Table 4.3).

65. There is potential for impacts on the hydromorphology (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 e.g. permanent culverts. This could impact upon the hydrology the surface water system; and
- Increased sediment supply to surface waters during operation via surface runoff from the onshore project substations, which could impact upon the geomorphology of the river water bodies.

66. There is potential for impacts on the physico-chemistry (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; and
- 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.

67. There is potential for impacts on biological 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.

68. Operational activities under Scenario 1 and Scenario 2 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.

69. Table 5.6 demonstrates that the operational infrastructure and associated maintenance activities do not have the potential to impact upon the quantity or quality of groundwater under either Scenario 1 or Scenario 2. Although the presence of the buried cable ducting throughout the cable route has the potential 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 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 5.5 Project operation and maintenance: Scoping questions for river water bodies (Scenarios 1 and 2)

Parameter	Scoping question	Answer	Applicable 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	Yes	East Ruston Stream New Cut North Walsham and Dilham Canal

Parameter	Scoping question	Answer	Applicable water bodies
	body, or lead to the direct loss or modification of shelter, feeding and spawning habitats for fish?		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 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,	Yes	East Ruston Stream New Cut

Parameter	Scoping question	Answer	Applicable water bodies
	salinity or nutrient concentrations in the water body?		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 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	Yes	-
		No	East Ruston Stream

Parameter	Scoping question	Answer	Applicable water bodies
	one of the improvement or mitigation measures that is not yet in place?		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 5.6 Project operation and maintenance: Scoping questions for groundwater bodies (Scenarios 1 and 2)

Parameter	Scoping question	Answer	Applicable water bodies
Groundwater quantity	Could 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
	Could the activity lead to saline intrusion?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Could 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
	Could 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
	Could 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
	Could 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	Could the activities have the potential to result in or exacerbate widespread diffuse pollution at a water body scale?	Yes	-
		No	Broadland Rivers Chalk & Crag

Parameter	Scoping question	Answer	Applicable water bodies
			Cam and Ely Ouse Chalk North Norfolk Chalk
	Could 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
	Could the activity lead to saline intrusion?	Yes	-
		No	Broadland Rivers Chalk & Crag Cam and Ely Ouse Chalk North Norfolk Chalk
	Could 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
	Could 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
	Could 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

5.4 Summary of Stage 2

70. The Stage 2 scoping assessment has established that onshore construction activities, watercourse crossings and operation-stage activities under both Scenario 1 and Scenario 2 have the potential to cause deterioration in the status of a number of river water bodies (Table 5.7). The potential impacts of these activities have therefore been carried forward to the Stage 3 Detailed Compliance Assessment. However, no mechanism for impact on the groundwater bodies was identified under

either Scenario 1 or Scenario 2. These have therefore been excluded from the assessment at this stage.

71. 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.

Table 5.7 Summary of Stage 2 Scoping assessment

Water body	Construction activities	Watercourse crossings	Operation and maintenance
New Cut	✓	×	✓
East Ruston Stream	✓	✓	✓
North Walsham & Dilham Canal	✓	✓	✓
King's Beck	✓	✓	✓
Bure (Scarrow Beck to Horstead Mill)	✓	✓	✓
Mermaid Stream	✓	×	✓
Blackwater Drain (Wensum)	✓	✓	✓
Wensum US Norwich	✓	✓	✓
Wendling Beck	✓	✓	✓
Wissey-Upper	✓	✓	✓
Broadland Rivers Chalk & Crag	×	×	×
Cam and Ely Ouse Chalk	×	×	×
North Norfolk Chalk	×	×	×

6 Stage 3: Detailed Compliance Assessment

6.1 Purpose of this Section

72. This section presents the results of the detailed compliance assessment undertaken on the water bodies identified in section 5.4 of this report, using the method outlined in section 3.4.

73. 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. Scenario 1 and Scenario 2 have both been assessed and the findings are presented in this section.

6.2 Control Measures

74. In a WFD context, the term 'mitigation measures' is used specifically to refer to measures identified by the Environment Agency in the relevant RBMP to address pressures in A/HMWBs. The term "control measures" is therefore used in this assessment to refer to measures used to mitigate the impacts of the project. These control measures are analogous to the 'mitigation measures' referred to in the ES.

75. Norfolk Boreas 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.

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

77. 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 6.1. Where embedded mitigation measures have been developed into the design of the project with specific regard to surface and groundwaters, these are described in Table 6.2.

Table 6.1 Embedded control measures (Scenario 1 and 2)

Parameter	Control measures embedded into the project design	Notes
Project Wide		
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 under Scenario 2 this reduces the cable route working width to 35m from the previously identified worst case of 50m. As a result, the overall footprint of the onshore cable route required for the duct installation phase is reduced from approx. 300ha to 210ha; • The width of permanent cable easement is also reduced from 25m to 13m; • Removes the requirement for a cable relay station as permanent above ground infrastructure; • Reduces the maximum duration of the cable pulling phase from three years down to two years;	Norfolk Boreas 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	Control measures embedded into the project design	Notes
	• Reduces the total number of jointing pits for Norfolk Boreas 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 explanation see Chapter 4 Site Selection and Alternatives) for onshore project substations and National Grid substation extension and associated 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 Boreas 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.
Long HDD at Landfall	Use of long HDD at landfall to avoid restrictions or closures to Happisburgh beach and retain access to the beach during construction. Norfolk Boreas Limited has also committed to not using the beach car park at Happisburgh South.	Norfolk Boreas 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.

Parameter	Control measures embedded into the project design	Notes
Scenario 1		
Strategic approach to delivering Norfolk Vanguard and Norfolk Boreas	Under Scenario 1, 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 Boreas and Norfolk Vanguard has been a project commitment from the outset of each project.
Scenario 2		
Duct installation strategy	Under Scenario 2, the onshore cable duct installation strategy is proposed to be conducted in a sectionalised approach in order to minimise impacts. Construction teams 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 also minimise overall disruption.	This has been a project commitment from the outset. Chapter 5 Project Description provides a detailed description of the process.
Trenchless crossings (Scenario 2)	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 Boreas Limited has committed to certain additional trenchless crossings as a direct response to stakeholder requests.

Table 6.2 Embedded control measures for surface and groundwater (Scenario 1 and 2)

Parameter	Control measures embedded for surface and groundwater	Notes
Scenario 1		
Surface drainage	Changes in surface water runoff as a result of the increase in impermeable area from the onshore project 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 (e.g. a new larger pond to replace 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.	n/a
Foul drainage	During the construction phase, foul drainage at the onshore project substation will be collected through a mains connection to existing local authority sewer system (if available) or septic tanks located within the development boundary. 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
Scenario 2		
Sediment management	The area of open ground at any one time within one sub-catchment will be restricted, across a notional 5 km length, to 2 working areas (configured as 35m x 300m strips), 50% of one mobilisation area, 50% of one set of trenchless crossing compounds and 25% of 5km running track. 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. Temporary works areas (e.g. mobilisation areas and trenchless crossing areas) within the onshore project area will comprise hardstanding of permeable gravel aggregate underlain by geotextile, or other suitable material to a minimum of 50% of the total area to minimise the area of open ground.	These measures apply to the cable route only.

Parameter	Control measures embedded for surface and groundwater	Notes
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.	These measures apply to the cable route only.
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 Boreas. 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. Depending upon the precise location, water from the channels will be infiltrated or discharged into the surface drainage network.	n/a
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

78. The assessment presented in the subsequent sections of this report assumes that these control measures are in place and identifies additional measures where appropriate.

6.3 Construction Activities at the Onshore Substations and Along the Cable Route

6.3.1 Overview

79. Onshore construction activities under Scenario 1 (including cable pulling, installation of joint pits, reinstatement of running track and construction of onshore project substation and Necton National Grid substation extension) and Scenario 2 (including site preparation, construction of running track and earthworks and other construction activities associated with the cable route, onshore project substation and Necton National Grid substation extension) 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);
- Wendling Beck; and
- Wissey – Upper.

80. This considers all construction activities that will take place within the water body catchments, excluding watercourse crossings. These are considered separately in section 6.4.

81. 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.

82. 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.

83. 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.

84. 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. This is used as the basis of the assessment presented for Scenario 1 and Scenario 2 below.

6.3.2 Scenario 1

6.3.2.1 Potential Impacts on Water Body Status

85. Construction-stage activities within the New Cut, East Ruston Stream, North Walsham & Dilham Canal, King's Beck, River Bure, Mermaid Stream, Blackwater, Wensum US Norwich and Wendling Beck water body catchments will be limited to installation of cables in the pre-installed ducts, the construction of joint pits (each with an area of 90m^2) and the reinstatement of limited areas of running track. The construction activities within the River Bure and River Wensum catchments are expected to be the same therefore the impacts on these two catchments have been assessed alongside each other.

86. For the purposes of this assessment, the number of joint pits within each water body catchment has been estimated based on the worst-case interval of every 800m along the cable route, rounded up to the nearest whole number. Furthermore, it is also assumed that, as a worst case, it will be necessary to reinstate 20% of the running track and that all of this area will be unprotected. The resulting total area of ground disturbance within each water body catchment is shown in Table 6.3.

87. Construction activities including the onshore project substation, National Grid substation extension and cable installation works will disturb a maximum of 0.16km^2 (0.18%) of the Wissey – Upper water body catchment (Table 6.3).

Table 6.3 Area of disturbed ground in river water body catchments (Scenario 1)

Water body	Maximum total area of disturbed ground km²	%
New Cut	0.0068	0.03
East Ruston Stream	0.0083	0.03
North Walsham & Dilham Canal	0.0097	0.02
King's Beck	0.0084	0.01
Bure (Scarrow Beck to Horstead Mill)	0.0088	0.02
Mermaid Stream	0.0025	0.01
Blackwater Drain (Wensum)	0.0165	0.03
Wensum US Norwich	0.0104	0.01
Wendling Beck	0.0182	0.02
Wissey-Upper	0.1580	0.18

6.3.2.2 Control Measures

88. In addition to the embedded control measures set out in section 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.

- 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 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.

- 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).
- 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.

6.3.2.3 Summary of Impacts on Water Body Status

89. 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.

6.3.3 Scenario 2

6.3.3.1 Potential Impacts on Water Body Status

90. Construction-stage activities in the New Cut, East Ruston Stream, North Walsham & Dilham Canal, King's Beck, River Bure, Mermaid Stream, Blackwater, Wensum US Norwich and Wendling Beck water bodies will include the excavation of cable trenches, the construction of a running track and earthworks and other construction activities associated with the onshore project substation and National Grid substation extension.

91. The maximum total area that could potentially be disturbed in each water body catchment during the entire 2-year construction period is summarised in Table 6.4. However, it is important to note that the active working area at any one time will be restricted in spatial extent (0.011km^2) and duration (2 weeks). The worst-case assumption is that, in a notional 5km stretch of cable route, work at any one time

will be restricted to a maximum of two workfronts (0.022km^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 catchment, and the results are shown in Table 6.4. Note that, where a water body 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 6.4 Area of disturbed ground in river water body catchment (Scenario 2)

Water body	Maximum total area of disturbed ground		Maximum working area at any one time	
	km^2	%	km^2	%
New Cut	0.1670	0.82	0.06	0.30
East Ruston Stream	0.2020	0.81	0.07	0.29
North Walsham & Dilham Canal	0.2370	0.44	0.08	0.16
King's Beck	0.2048	0.29	0.07	0.10
Bure (Scarrow Beck to Horstead Mill)	0.2156	0.57	0.08	0.20
Mermaid Stream	0.0606	0.29	0.04	0.20
Blackwater Drain (Wensum)	0.4060	0.62	0.14	0.22
Wensum US Norwich	0.2534	0.13	0.09	0.05
Wendling Beck	0.4480	0.56	0.16	0.20
Wissey-Upper	0.2614	0.30	0.2614	0.30

6.3.3.2 Control Measures

92. In addition to the measures identified for Scenario 1 above, the following measures will also be implemented for Scenario 2:

- A Surface Water and Drainage Plan (SWDP) will be developed and implemented to minimise water within the cable trench and ensure ongoing drainage of surrounding land. Where water enters the cable 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.
- Cable excavations will be designed not to disturb groundwater in any significant manner. Excavations will be shallow (approximately 1.5m) and above the water table of the Principal Aquifer. If works are required in the SPZ1 or SPZ2 areas, the construction working methodology (for example a CMS) will stipulate that the best available techniques (BAT) are used for any installations, in accordance with the Energy Network Association Guidance, and in agreement with the Environment Agency. Furthermore, a hydrogeological risk assessment meeting the requirements of Groundwater Protection Principles and Practice (GP3) (Environment Agency, 2017), will be undertaken for any trenchless crossing locations in SPZ1 or 2 areas (specifically the North Walsham and Dilham Canal).

If significant risks are identified, alternatives including alternative trenchless drilling techniques (other than HDD) to cross the SPZ area will be considered.

6.3.3.3 Summary of Impacts on Water Body Status

93. 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.

6.4 Installation of Watercourse Crossings

6.4.1 Overview

94. Onshore construction activities have the potential to directly alter the hydromorphology and physical habitat value of surface water bodies as a result of the installation of cabling across surface watercourses.

95. The installation of cable trenches in Scenario 2 will directly disturb the bed and banks of watercourses. This could potentially result in the direct loss of natural geomorphological features (and associated physical habitat niches) and geomorphological instability (e.g. due to enhanced scour and increased sediment supply). However, this would be a temporary impact provided that the bed and banks are reinstated to their original level, position, planform and profile. Note that subsequent cable pulling through the pre-installed ducting will not result in any further disturbance.

96. The installation of temporary culverts under Scenario 1 and permanent and temporary under Scenario 2 would also directly disturb the bed and banks of the watercourse and result in the direct loss of natural geomorphological features within the footprint of the structure. This impact would be reversible once temporary culverts have been removed and the bed and banks reinstated but would be permanent for permanent culverts under Scenario 2.

97. The presence of temporary dams (to allow watercourses to be crossed in dry conditions under Scenario 2) and culverts (used for the running track under both scenarios) could potentially result in reduced flow and sediment conveyance (particularly of coarse sediment), create upstream impoundment, affect patterns of erosion and sedimentation, impede river continuity, increase turbidity and potentially encourage fine sedimentation on the bed upstream. Changes to flow conditions could also result in a reduction in the dissolved oxygen concentrations supported in the watercourses upstream of the impoundment. These activities could therefore reduce the physical habitat value of the watercourse for species

such as brown trout, bullhead and brook lamprey. The temporary dams could also act as a barrier to the movement of fish and other aquatic organisms. However, these impacts are considered to be temporary (i.e. confined to the duration of construction, which could be up to two years for the temporary culverts but restricted to several weeks for the temporary dams) and would be reversed once the temporary impounding structures were removed.

98. The presence of permanent culverts installed to allow the cable ducting to cross watercourses could result in the same suite of impacts but on a permanent and irreversible basis.

6.4.2 Scenario 1

6.4.2.1 Potential Impacts on Water Body Status

99. Under Scenario 1 the cables will be pulled through pre-installed ducts (installed as part of the Norfolk Vanguard project), which means that there will be no need to install any permanent culverts at watercourse crossing locations. Although this will not require the installation of cable ducting to cross surface watercourses, there will be a need for temporary culverts to be reinstalled so that watercourses can be crossed by the running track. The number of temporary watercourse crossings required within each water body is shown in Table 6.5.

100. The Mermaid Stream and New Cut will not be crossed therefore were scoped out during Stage 2 of the assessment.

Table 6.5 Temporary watercourse crossings in water bodies (Scenario 1)

Water body	Number of crossings
East Ruston Stream	2
North Walsham & Dilham Canal	2
King's Beck	1
Bure (Scarrow Beck to Horstead Mill)	5
Blackwater Drain (Wensum)	1
Wensum US Norwich	2
Wendling Beck	2
Wissey-Upper	1

101. With regards to hydromorphology, there is potential for temporary watercourse crossings to impact upon 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 the installation of temporary culverts for the running track.

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

102. 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 from construction vehicles during temporary culvert installation and removal, which could impact upon surface water quality.

103. 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 culverts (e.g. preventing upstream and downstream movement of biota) and the potential changes to hydromorphology and physico-chemistry described above.

6.4.2.2 Control Measures

104. In addition to the embedded control measures described in section 6.2, additional measures would be applied to reduce the impacts associated with watercourse crossings as set out below for Scenario 1. Potential impacts resulting from the use of temporary culverts at watercourse crossings along the running track 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.

105. Furthermore, alternative techniques such as temporary bridges will be considered where appropriate (e.g. where installation of a temporary culvert is likely to have a significant impact on channel morphology and ecology).

6.4.2.3 Summary of Impacts on Water Body Status

106. 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.

6.4.3 Scenario 2

6.4.3.1 Potential Impacts on Water Body Status

107. Unlike Scenario 1, Scenario 2 will require the installation of cable ducting between the landfall and onshore project substation. 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 water bodies identified in Table 6.6, which also provides a summary of the crossing techniques proposed for use in each water body.

108. The Mermaid Stream and New Cut will not be crossed and were therefore scoped out during Stage 2 of the assessment.

Table 6.6 Watercourse crossing techniques in each water body (Scenario 2)

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

109. Trenchless crossing techniques (e.g. HDD) have been embedded within the project 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 trenchless technique such as HDD, micro-tunnelling or auger boring (Chapter 5 Project Description). These techniques cause 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 during trenchless techniques, and good practice measures will be implemented to prevent contamination from construction equipment (see section 6.2 for further details).

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

111. 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.

112. At trenched crossing locations, the cable will be buried a minimum of 1.5m below the bed level of watercourses.

113. 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.

114. With regards to hydromorphology, there is potential for watercourse crossings to impact upon 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 and installation of culverts.
- 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.

115. 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.

116. 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.

6.4.3.2 Control Measures

117. In addition to the embedded measures described in Table 6.1, the following additional measures would be applied to reduce the impacts associated with watercourse crossings, under Scenario 2:

- The specific 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 significant impacts on the hydromorphological and biological quality elements of a water body);
- Cable ducts would be installed a minimum of 1.5m watercourses at all trenched crossing locations. Cable ducts will also be installed a minimum of 2m below bed level at trenchless crossing locations. This will ensure that there is sufficient thickness of natural bed substrates 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 (allowing for climate-related increases in fluvial flows and erosion in the future); 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.

6.4.3.3 Summary of Impacts on Water Body Status

118. 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.

6.5 Operation and Maintenance of Permanent Onshore Infrastructure

6.5.1 Potential Impacts on Water Body Status under Scenario 1 and Scenario 2

119. Under Scenario 1 and Scenario 2, 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 surface and subsurface infrastructure along the cable route and at the onshore project substation sites:

- 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);
- Wendling Beck; and
- Wissey – Upper.

120. 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 due to the presence of the landfall and onshore project substation infrastructure. This could impact upon the hydrology the surface water system;
- Changes to morphological conditions, hydrology and river continuity due to the presence of permanent infrastructure along the cable route (including ducts and culverts); 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.

121. 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; and
- 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.

122. 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.

123. 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.

124. 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.

6.5.2 Control Measures

125. In addition to the embedded control measures set out in section 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 for Scenario 1 and Scenario 2, as set out below.

- For Scenario 2, existing land drains along the onshore cable route will be reinstated following construction so that they do not affect subsurface flows during the operational phase. A local specialised drainage contractor will undertake surveys to locate drains and create drawings both pre- and post-construction, and ensure appropriate reinstatement. For Scenario 1, this procedure will be undertaken during duct installation by the Norfolk Vanguard Project.
- For both Scenario 1 and Scenario 2, surface water drainage requirements for operational onshore project substation will be dictated by the final Operational Drainage Plan (ODP) 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 ODP 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.

6.5.3 Summary of Impacts on Water Body Status

126. 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 or ground water bodies as a result of the operation or maintenance under Scenario 1 and 2. This means that these operational 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.

6.6 Cumulative Impacts

127. Construction of the onshore project elements and watercourse crossings may 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 under both Scenario 1 and Scenario 2.

128. However, the maximum construction presence at any one time across all water bodies has been taken into account in the main assessment and 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 further cumulative impacts to occur in the river water bodies scoped in to the assessment for either Scenario 1 or Scenario 2.

7 Stage 4: Summary of Assessment and Mitigation Requirements

7.1 Purpose of this Section

129. 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.

7.2 Summary of Assessment

130. The results of the WFD compliance assessment process outlined in this report is provided in Table 7.1.

Table 7.1 Summary of WFD compliance assessment (Scenario 1 and Scenario 2)

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
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

131. This demonstrates that, following the mitigation measures summarised in sections 6.2, 6.3, 6.4 and 0, 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.

7.3 Summary of Mitigation

132. 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 6.1 in section 6.2. In addition to these embedded control measures, a range of further control measures are outlined in sections 6.3, 6.4 and 0 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.

7.4 Summary of Improvements

133. 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. 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 6.4) and cumulatively could potentially contribute towards an improvement in water body status.

8 References

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9 Annex 1 Scoping table

9.1 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

9.2 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.
		Yes	Further assessment required

Parameter	Scoping question	Answer	Notes
	Will the activities have the potential to cause deterioration in the quality of a drinking water 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.

10 Annex 2 Figures

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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)

King's Beck (GB105034055730)

Foulsham Tributary (GB105034055850)

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)

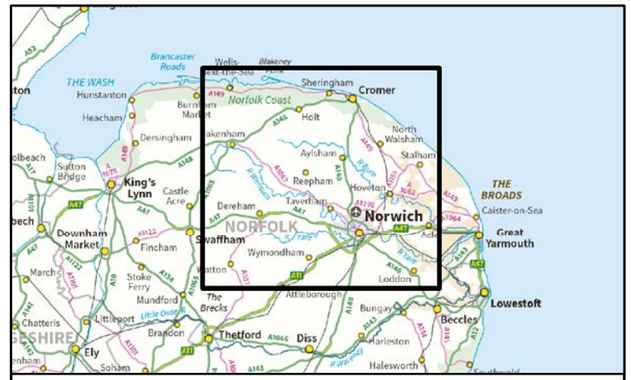
Wensum US Norwich (GB105034055881)

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

Wensum DS Norwich (GB105034055882)

Wissey - Upper (GB105033047890)

0 5 10 km



Legend:

- Norfolk Boreas onshore red line boundary
- WFD river water bodies[1]
- WFD river water body catchments[1]

[1] Environment Agency, 2017

Project:	Report:
Norfolk Boreas	Water Framework Directive Compliance Assessment

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

Figure: 20.2.1 Drawing No: PB5640-006-0202-001

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

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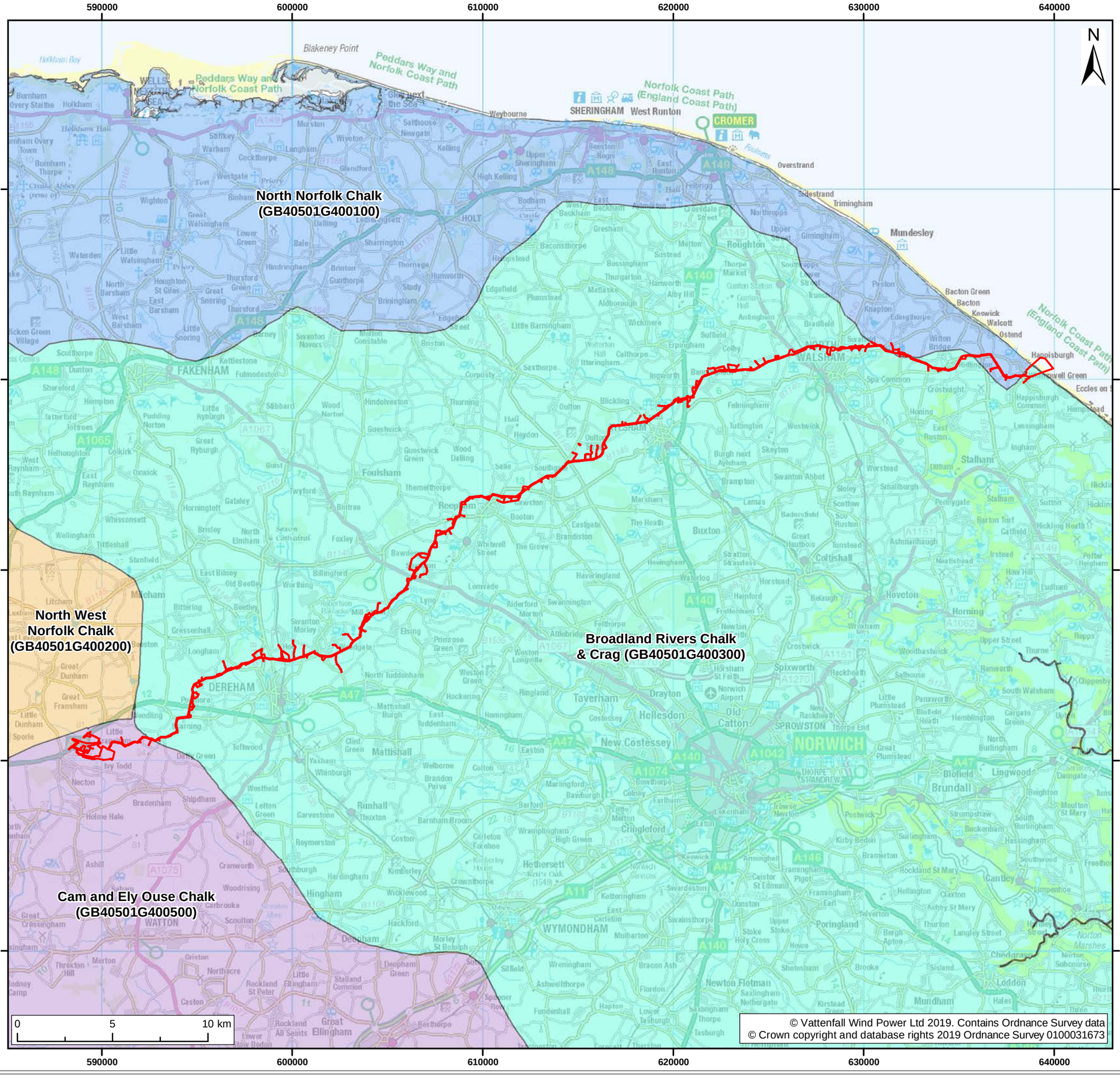

Legend:

- Norfolk Boreas onshore red line boundary

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 Boreas	Water Framework Directive Compliance Assessment

Title: WFD groundwater bodies screened into the WFD compliance assessment

Figure: 20.2.2 | Drawing No: PB5640-006-0202-002

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

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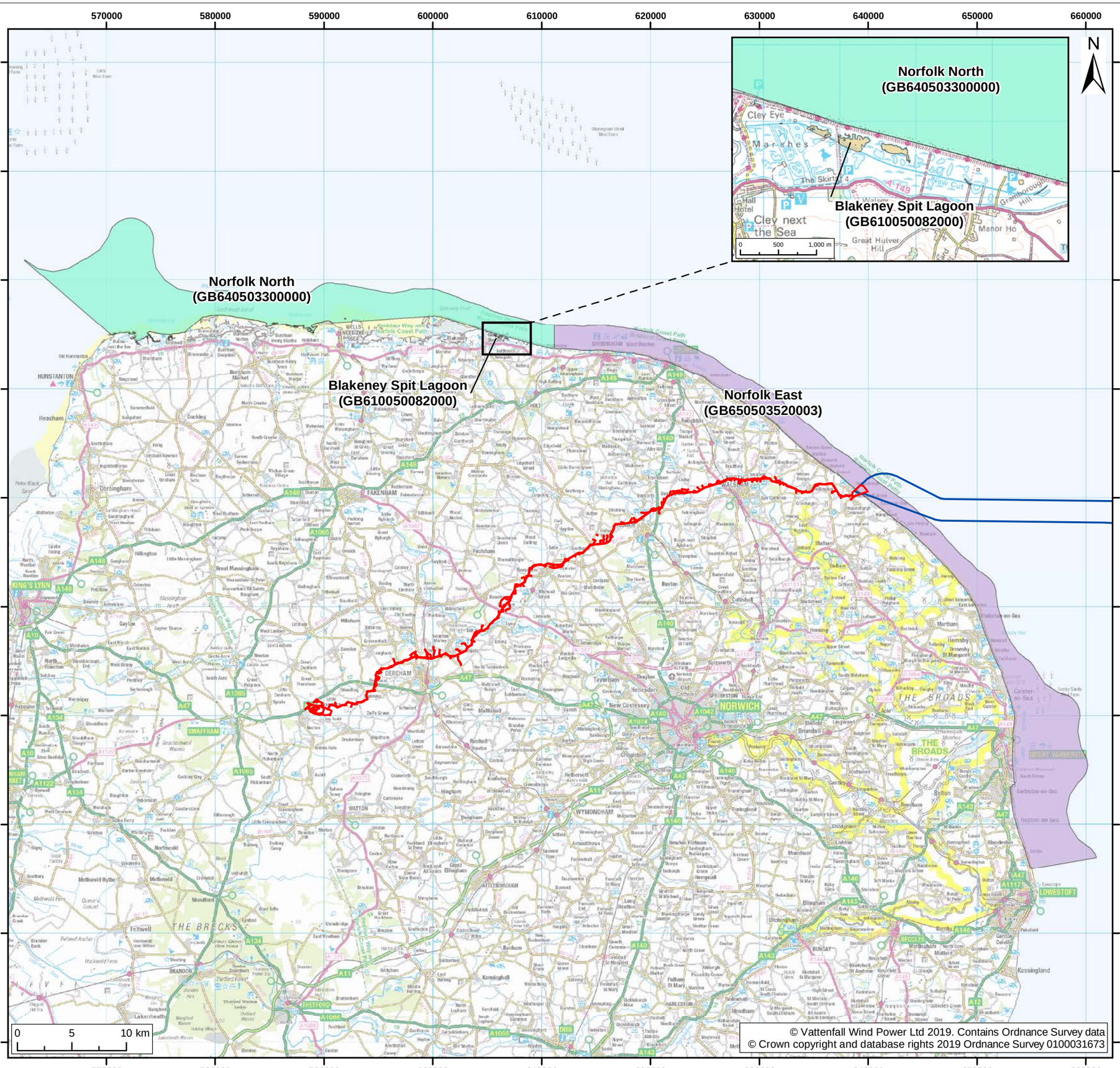

Legend:

- Norfolk Boreas onshore red line boundary
- Offshore cable corridor

WFD coastal water bodies[1]

- Blakeney Spit Lagoon
- Norfolk East
- Norfolk North

[1] Environment Agency, 2018

Project:	Report:
Norfolk Boreas	Water Framework Directive Compliance Assessment

Title:

WFD coastal water bodies screened into the WFD compliance assessment

Figure: 20.2.3 | Drawing No: PB5640-006-0202-003

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

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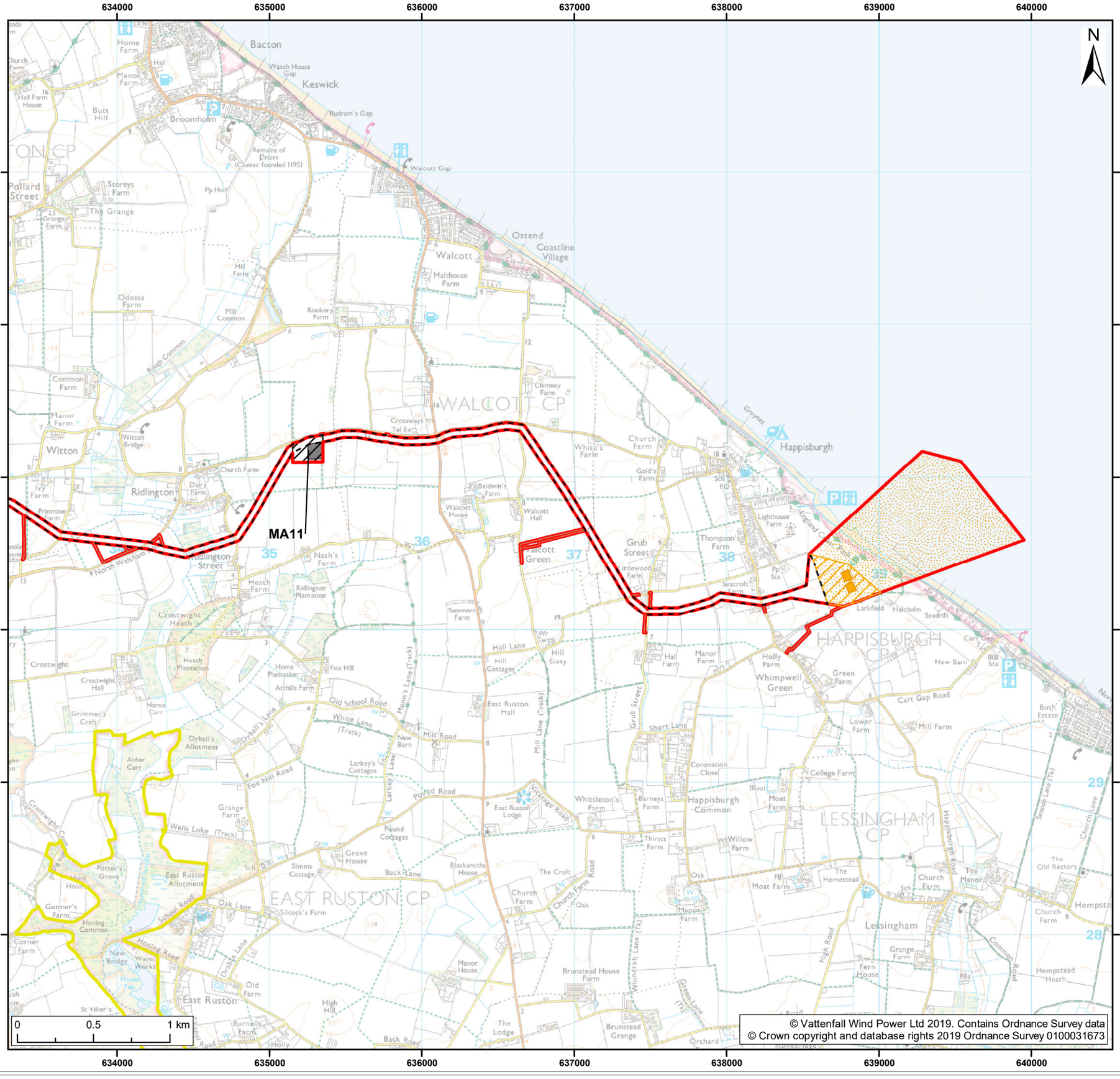

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Landfall zone
- Onshore cable route
- Landfall compound zone
- Indicative landfall compound
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Mobilisation zone
- Indicative mobilisation area compound

Protected areas

- National Park[1]

[1] Environment Agency, 2017.
[2] Natural England, 2019

Project:	Report:
Norfolk Boreas	Water Framework Directive Compliance Assessment

Title:

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

Figure: 20.2.4a | Drawing No: PB5640-006-0202-004a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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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

N

Knapton Cutting (LNR)

Pigney's Wood (LNR)

TC15

TC14a/b

TC14a

MA10

TC14a/b

TC13

MA10a

TC16

TC16

0 0.5 1 km

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

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

Protected areas

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

[1] Environment Agency, 2017.
[2] Natural England, 2019

Project:	Report:
Norfolk Boreas	Water Framework Directive Compliance Assessment

Title:

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

Figure: 20.2.4a | Drawing No: PB5640-006-0202-004a

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

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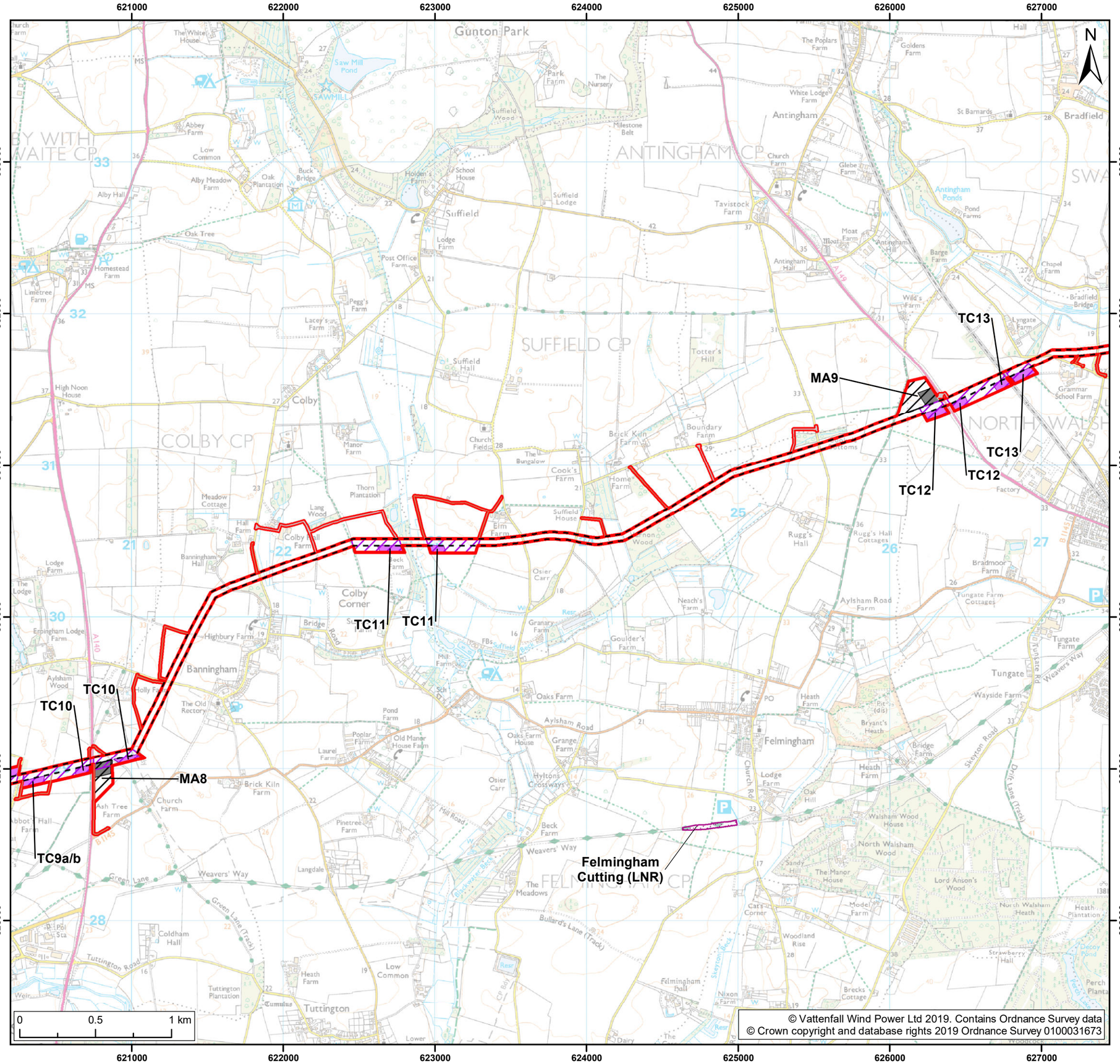

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

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

Protected areas

- Local Nature Reserve (LNR)[2]

[1] Environment Agency, 2017.
[2] Natural England, 2019

Project:	Report:
Norfolk Boreas	Water Framework Directive Compliance Assessment

Title:

Protected areas in the vicinity of the project (Map 3 of 9)

Figure: 20.2.4a | Drawing No: PB5640-006-0202-004a

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

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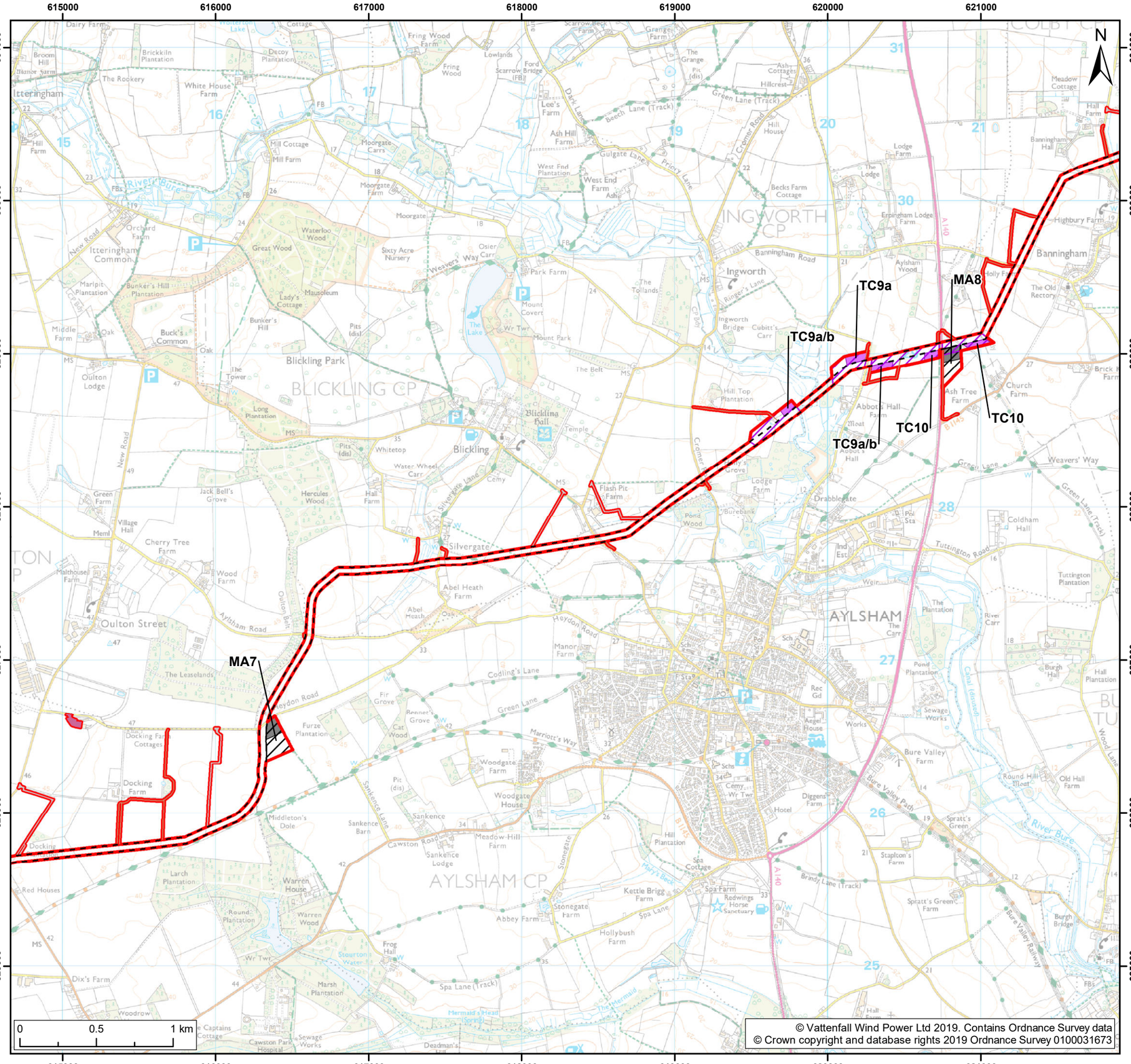

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Cable logistics area
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

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

[1] Environment Agency, 2017.
[2] Natural England, 2019

Project:	Report:
Norfolk Boreas	Water Framework Directive Compliance Assessment

Title:

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

Figure: 20.2.4a | Drawing No: PB5640-006-0202-004a

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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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

MA6

TC7

TC7

TC8

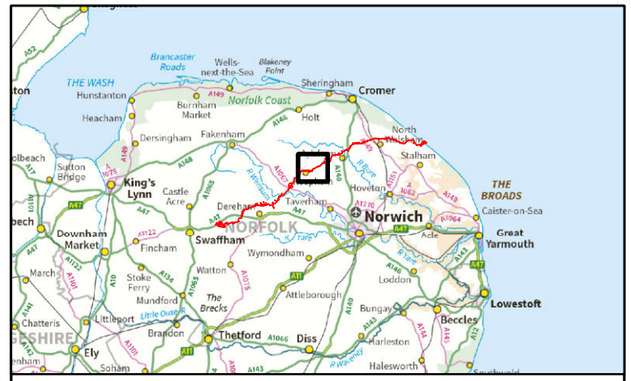
TC8

TC6

TC6

Norfolk Valley Fens (SAC)

N



Legend:

Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Cable logistics area
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

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

Protected areas

- Special Area of Conservation (SAC)[2]

[1] Environment Agency, 2017.
[2] Natural England, 2019

Project:	Report:
Norfolk Boreas	Water Framework Directive Compliance Assessment

Title:

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

Figure: 20.2.4a | Drawing No: PB5640-006-0202-004a

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

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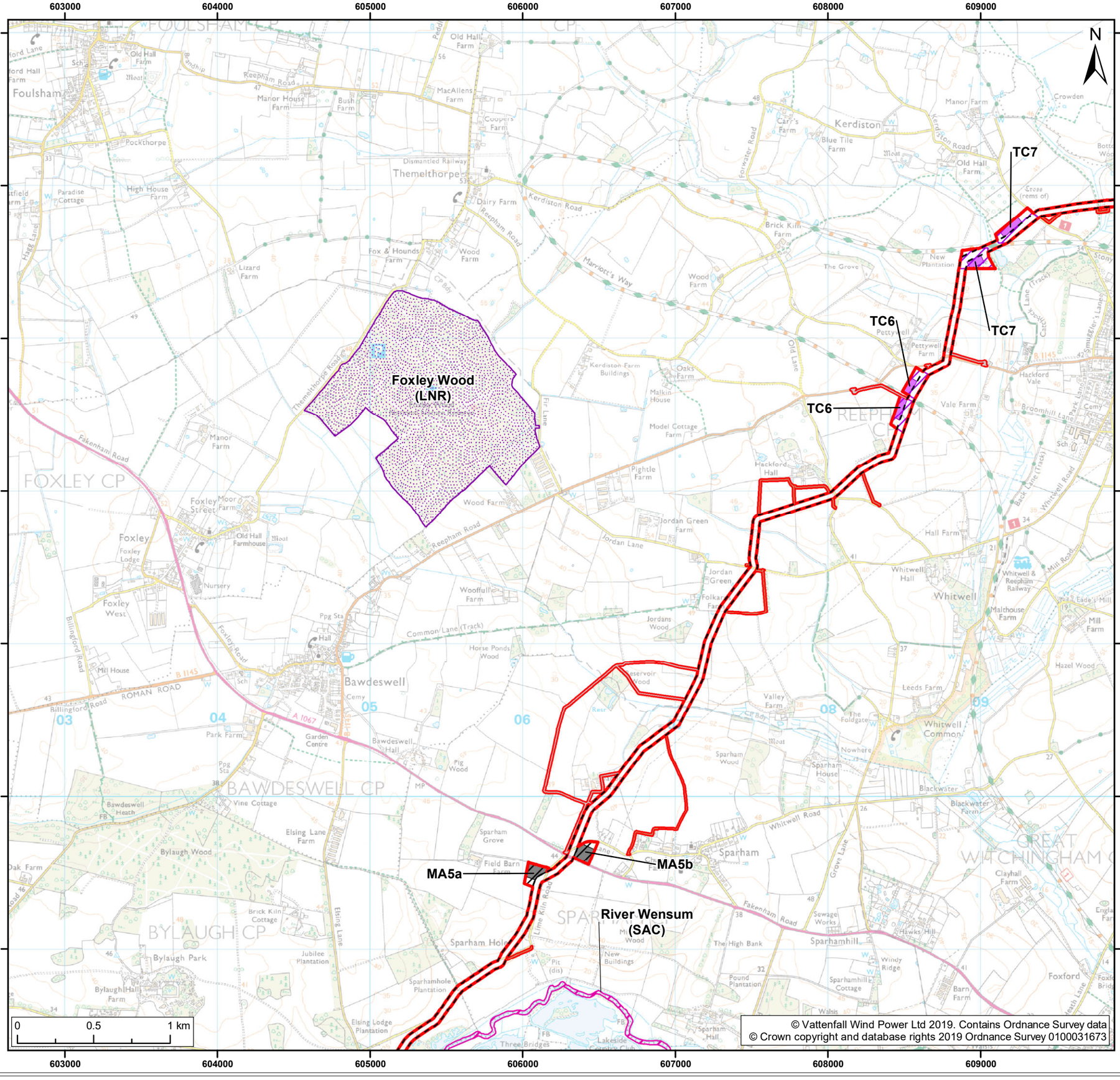
0 0.5 1 km



Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

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

Protected areas

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

[1] Environment Agency, 2017.
[2] Natural England, 2019

Project:	Report:
Norfolk Boreas	Water Framework Directive Compliance Assessment

Title:

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

Figure: 20.2.4a | Drawing No: PB5640-006-0202-004a

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

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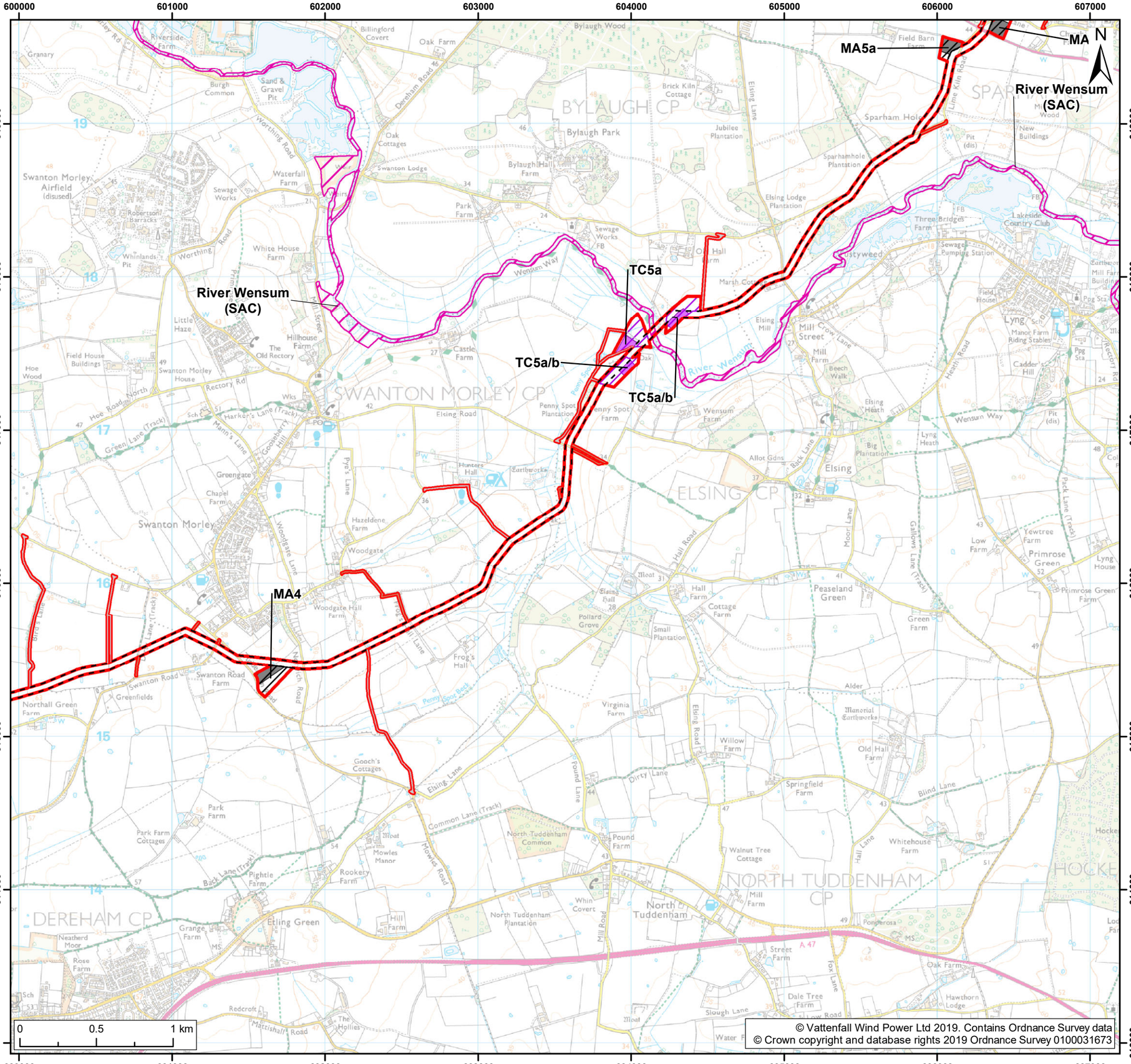

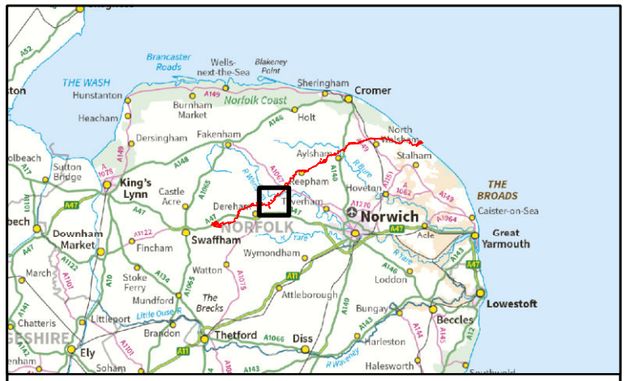

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

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

Protected areas

- Special Area of Conservation (SAC)[2]

[1] Environment Agency, 2017.
[2] Natural England, 2019

Project:	Report:
Norfolk Boreas	Water Framework Directive Compliance Assessment

Title:

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

Figure: 20.2.4a | Drawing No: PB5640-006-0202-004a

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

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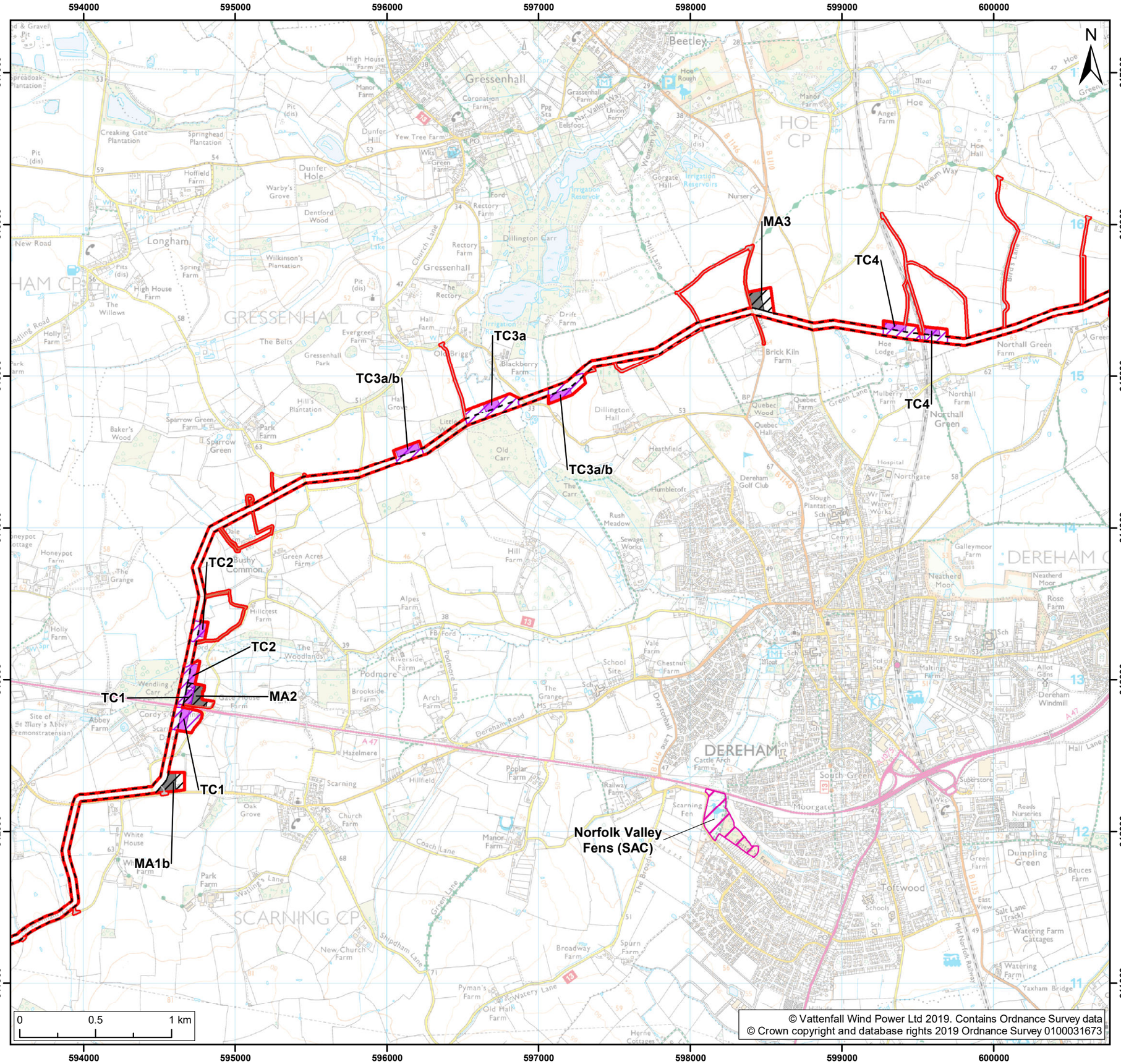

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Construction access
- Operational access

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

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

Protected areas

- Special Area of Conservation (SAC)[2]

[1] Environment Agency, 2017.
[2] Natural England, 2019

Project:	Report:
Norfolk Boreas	Water Framework Directive Compliance Assessment

Title:

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

Figure: 20.2.4a | Drawing No: PB5640-006-0202-004a

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

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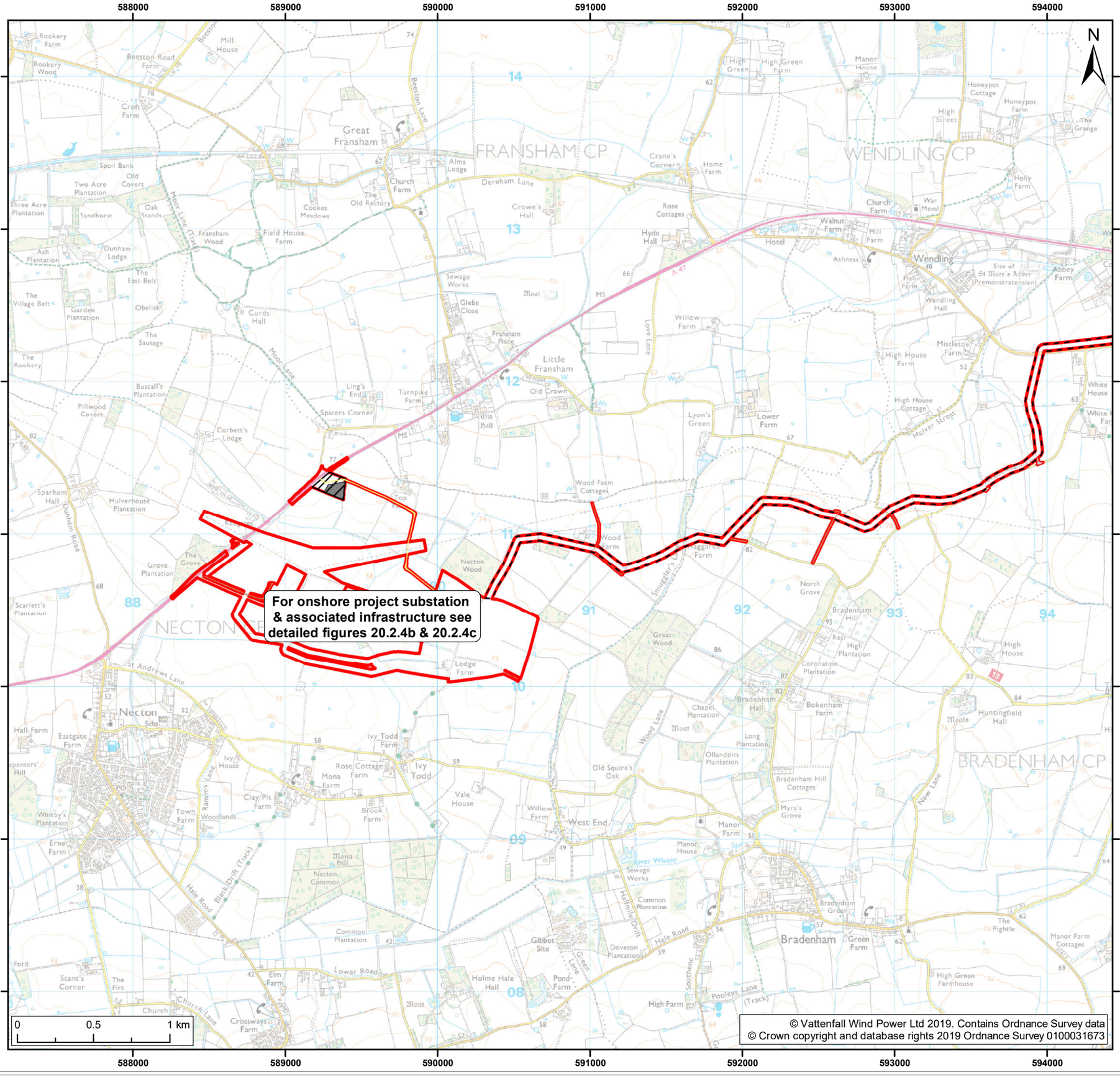

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1 & 2)

- Onshore cable route
- Mobilisation zone
- Indicative mobilisation area compound
- Construction access
- Operational access
- Permanent access

[1] Environment Agency, 2017.
[2] Natural England, 2019

Project:	Report:
Norfolk Boreas	Water Framework Directive Compliance Assessment

Title:

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

Figure: 20.2.4a | Drawing No: PB5640-006-0202-004a

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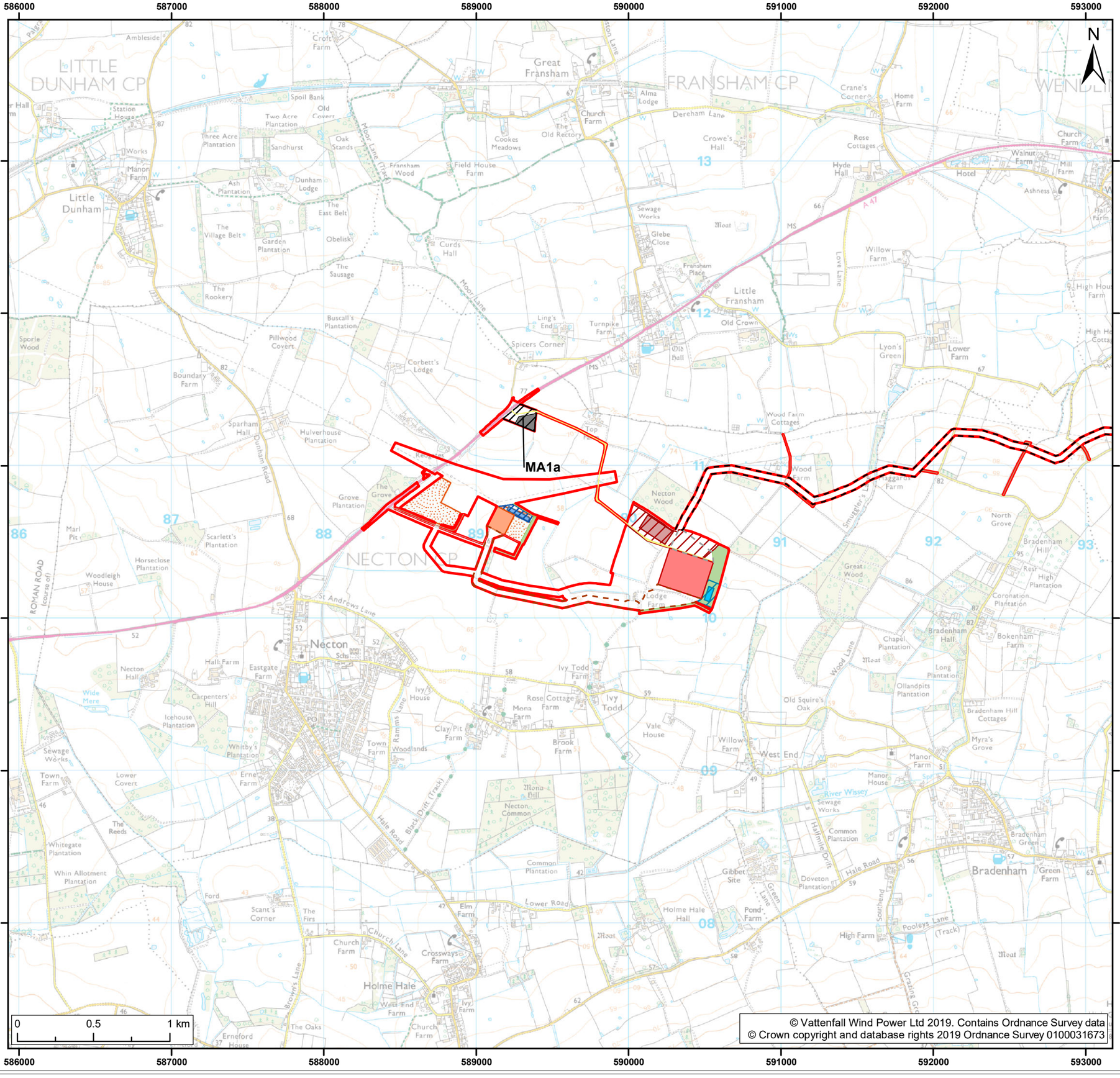

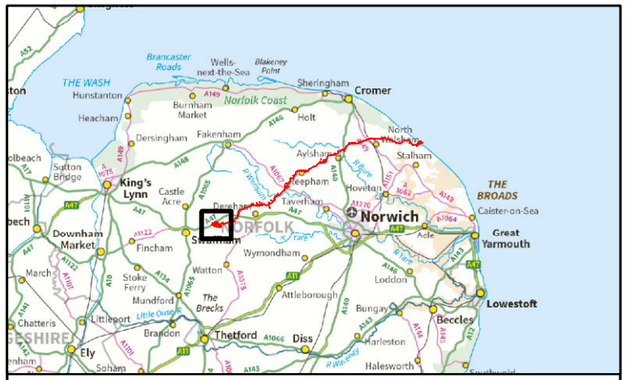

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 1)

- Onshore cable route
- Cable route entry to substation
- Onshore 400kV cable route
- Mobilisation zone
- Indicative mobilisation area compound
- Construction access
- Operational access
- Permanent access
- Onshore project substation
- Onshore project substation temporary construction compound zone
- Indicative onshore project substation temporary construction compound
- Attenuation pond zone
- Indicative attenuation pond
- Indicative mitigation planting
- National Grid substation extension
- National Grid temporary works
- National Grid attenuation pond location search area
- Indicative National Grid attenuation pond

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

Project:	Report:
Norfolk Boreas	Water Framework Directive Compliance Assessment

Title: Protected areas in the vicinity of the project

Figure:	Drawing No:
20.2.4b	PB5640-006-0202-004b

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

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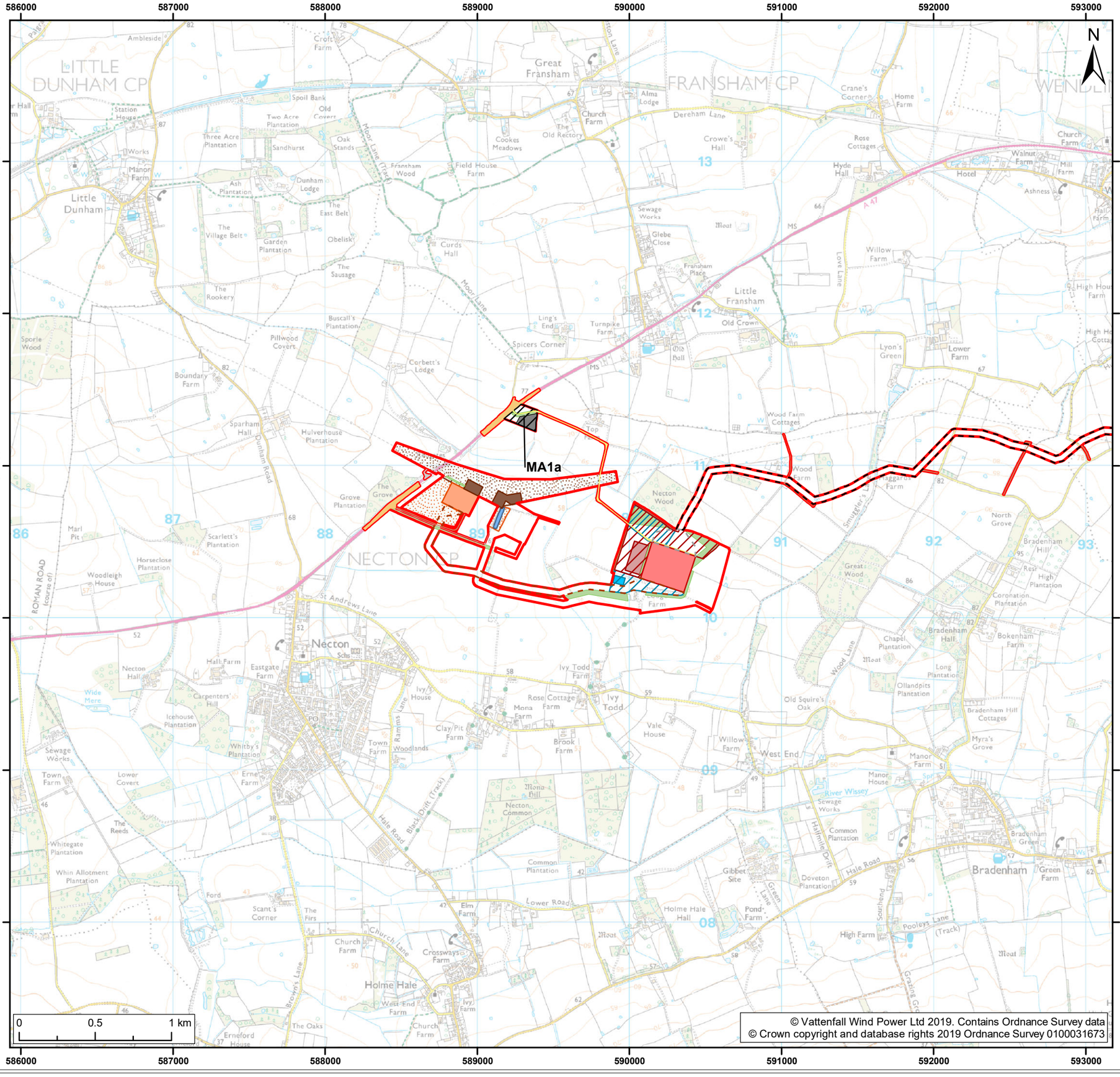

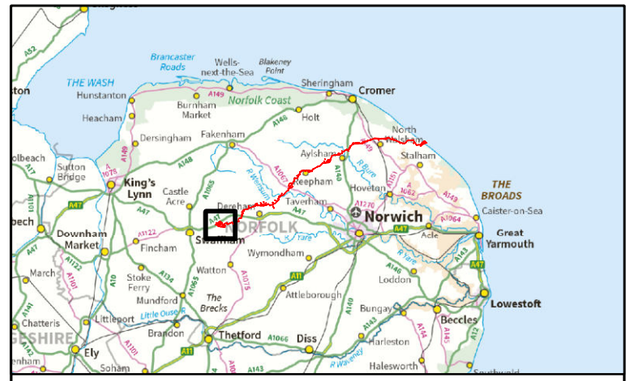

Legend:

- Norfolk Boreas red line boundary

Norfolk Boreas Onshore Project Infrastructure (Scenario 2)

- Onshore cable route
- Cable route entry to substation
- Onshore 400kV cable route
- Mobilisation zone
- Indicative mobilisation area compound
- Highways temporary works area
- Construction access
- Operational access
- Permanent access
- Onshore project substation
- Onshore project substation temporary construction compound zone
- Indicative onshore project substation temporary construction compound
- Attenuation pond zone
- Indicative attenuation pond
- Indicative mitigation planting
- National Grid substation extension
- National Grid new / replacement OHL tower search area
- National Grid temporary works
- Overhead line temporary works
- National Grid attenuation pond

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

Project:	Report:
Norfolk Boreas	Water Framework Directive Compliance Assessment

Title: Protected areas in the vicinity of the project

Figure: 20.2.4c | Drawing No: PB5640-006-0202-004c

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

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