FIVE ESTUARIES OFFSHORE WIND FARM

REPORTS

VOLUME 9, REPORT 6: WATER FRAMEWORK DIRECTIVE ASSESSMENT - ONSHORE

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CONTENTS

TABLES

FIGURES

DEFINITION OF ACRONYMS

Definition	Term
AIL	Abnormal Indivisible Load
AWB	Artificial Water Body
CBS	Cement Bound Sand
CoCP	Code of Construction Practice
CJEU	Court of Justice of the European Union
CoSHH	Control of Substances Hazardous to Health
EA	Environment Agency
EACN	East Anglia Connection Node
ECC	Export Cable Corridor
EIA	Environmental Impact Assessment
ES	Environmental Statement
EQS	Environmental Quality Standards
VE	Five Estuaries Offshore Wind Farm
VE OWFL	Five Estuaries Offshore Wind Farm Ltd
FRA	Flood Risk Assessment
GCS	Good Chemical Status
GEP	Good Ecological Potential
GES	Good Ecological Status
GS	Good Status
GW	Ground Water
HMWB	Heavily Modified Water Body
HDPE	High Density Polyethylene
HVAC	High Voltage Alternating Current
HDD	Horizontal Directional Drilling
NRW	Natural Resources Wales
NGET	National Grid Electricity Transmission
NRW	Natural Resources Wales
OECR	Offshore Export Cable Route
OWF	Offshore Wind Farm
O&M	Operation & Maintenance

Definition	Term
PRoW	Public Right of Way
PBDE	Polybrominated Diphenyl Ethers
RBD	River Basin District
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SSA	Substation Search Areas
SPA	Special Protected Area
SSS	Site Selection Study
TCC	Temporary Construction Compound
TDC	Tendring District Council
TJB	Transition Joint Bay
WFD	Water Framework Directive
WTG	Wind Turbine Generator

GLOSSARY OF TERMS

Term	Definition
Array Areas	The areas where the WTGs will be located.
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact in question with the sensitivity of the receptor in question, in accordance with defined significance criteria.
Impact	An impact to the receiving environment is defined as any change to its baseline condition, either adverse or beneficial, resulting from the activities associated with the construction, operation and maintenance, or decommissioning of the project.
Landfall	The landfall denotes the location where the offshore export cables are brought ashore and jointed to the onshore cable circuits in TJBs.
Onshore ECC	The working area for the onshore cable construction.
OnSS Zone	The area in which the final Onshore Substation footprint will be located.
Order Limits	The extent of development including all works, access routes, Temporary Construction Compounds (TCCs), visibility splays and discharge points.
River Basin Management Plans	River basin management plans (RBMPs) set the legally binding locally specific environmental objectives that underpin water regulation (such as permitting) and planning activities.
TJB	Transition Joint Bay is an underground unit where the offshore cable is jointed to the onshore cable.

1 INTRODUCTION

1.1 BACKGROUND

1.1.1 This Water Framework Directive (WFD) Assessment has been prepared for the development of the onshore elements of the Five Estuaries Offshore Wind Farm (hereafter referred to as 'VE').

1.1.2 VE is a proposed extension to the operational Galloper Offshore Wind Farm (OWF). The Galloper OWF consists of 56 Wind Turbin Generators (WTGs) and supplies electricity to approximately 380,000 households annually. A 60-strong team operates and maintains the wind farm from a state-of-the-art, purpose-built Operations & Maintenance facility in Harwich International Port. The key drivers for renewable energy in the UK, and therefore the VE project, are reducing greenhouse gas emissions, providing increased energy security, and maximising economic opportunities for the UK and local economies. The VE WTGs will be situated within two Array Areas to the east of the operational Galloper OWF. The Array Areas will be located approximately 37 km off the coast of Suffolk, England.

1.1.3 VE will consist of up to 79 WTGs. Cables will connect the turbines to the offshore substation platforms and then export the power generated to shore.

1.1.4 The onshore Order Limits comprise the landfall area, onshore cable corridor, onshore substation, as well as the associated compounds, storage areas and access roads. This WFD assessment has been carried out to provide the regulators with an overview of possible effects, in the context of the WFD, that may occur during the installation, operation, and decommissioning of the onshore elements of VE.

1.1.5 A separate WFD assessment for the offshore/marine Order Limits has been prepared (Volume 9, Report 7: Offshore WFD Assessment)

1.2 REPORT STRUCTURE

1.2.1 This WFD compliance assessment has been structured as follows:

- **Section 2: Legislation and Guidance** Overview of WFD Assessment;
- **Section 3: Project Description:** A summary of the onshore project description;
- **Section 4: Baseline Environment**: Summarises the existing baseline environment in relation to WFD status of the water bodies scoped into the assessment;
- **Section 5: Preliminary WFD Scoping Assessment** – identifies the potential impacts on WFD status and excludes any activities that do not need to go through the scoping or impact assessment stages;
- **Section 6: Detailed Assessment** – considers the potential impacts of an activity, identifies ways to avoid or minimise impacts, and indicates if an activity may cause deterioration or jeopardise the water body achieving GS; and
- **Section 7: Conclusion** – presents the key finding of the WFD compliance assessment.

2 LEGISLATION AND GUIDANCE

2.1 WATER FRAMEWORK DIRECTIVE

2.1.1 The WFD (Council Directive 2000/60/EC establishing a framework for community action in the field of water policy) was adopted by the European Commission in 2020. It is implemented in England and Wales principally[1] through the Water Environment (WFD) (England and Wales) Regulations 2017 (the Water Framework Regulations) (as amended), modified by the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 on 31 January 2020. The WFD thus remains in place post Brexit.

2.1.2 The overall objective of the WFD is to achieve good status (GS) in all inland, transitional, coastal and ground waters by 2015 (now working towards revised objectives for 2021 and beyond), unless alternative objectives are set and there are appropriate reasons for time limited derogation.

2.2 WATER BODY CLASSIFICATION

2.2.1 The WFD divides rivers, lakes, lagoons, estuaries, coastal waters (out to one nautical mile from the low water mark), man-made docks and canals into a series of discrete surface water bodies. It sets ecological as well as chemical targets (objectives) for each surface water body. For a surface water body to be in overall GS, the water body must be achieving good ecological status (GES) and good chemical status (GCS). Ecological status is measured on a scale of high, good, moderate, poor or bad, while chemical status is measured as good or fail (i.e. failing to achieve good).

2.2.2 Each surface water body has been assessed from a hydromorphological perspective to determine how modified it is from its natural state. Water bodies are either undesignated (i.e. natural, unchanged), designated as a heavily modified water body (HMWB) or designated as an artificial water body (AWB). HMWBs are defined as bodies of water which, as a result of physical alteration by sustainable human use activities (such as flood protection and navigation) are substantially changed in character and cannot therefore meet GES. AWBs are artificially created through human activity. The default target for HMWBs and AWBs under the WFD is to achieve good ecological potential (GEP); a status recognising the importance of their human use while ensuring ecology is protected as far as possible.

2.2.3 The ecological status of surface waters is classified using information on the biological (e.g., fish, benthic invertebrates, phytoplankton, angiosperms and macroalgae), physico-chemical (e.g., dissolved oxygen and salinity) and hydromorphological (e.g., hydrological regime) qualities of the body of water. In addition, several specific pollutants (e.g., copper and zinc) contribute to ecological status, as well as the mitigation measures assessment for HMWBs (i.e., review of suitable measures that are required to achieve GEP).

[1] The WFD is fully transposed into UK law via several mechanisms, including 'The Water Environment (WFD) (England and Wales) Regulations' (2003, 2015 & 2017); and 'The Environmental Permitting (England and Wales) (Amendment) Regulations', 2010 onwards.

2.2.4 Compliance with chemical status objectives is assessed in relation to environmental quality standards (EQS) for a specified list of ‘priority’ and ‘priority hazardous’ substances. These substances are established under the Priority Substances Directive (2013/39/EU) which sets objectives, amongst other things, for the reduction of these substances through the cessation of discharges or emissions. The Priority Substances Directive is transposed into UK legislation through the Water Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations 2015, which entered into force in September 2015, and explained in the WFD (Standards and Classification) Directions (England and Wales) 2015.

2.2.5 In addition to surface water bodies, the WFD also incorporates groundwater (GW) bodies. Groundwaters are assessed against different criteria compared to surface water bodies since they do not support ecological communities (i.e., it would not be appropriate to consider the ecological status of a groundwater). Therefore, groundwater water bodies are classified as having good or poor quantitative status in terms of their quantity (groundwater levels and flow directions) and quality (pollutant concentrations and conductivity), along with chemical (groundwater) status.

2.2.6 River Basin Management Plans (RBMPs) are a requirement of the WFD, setting out measures for each river basin district to maintain and improve quality in surface and groundwater water bodies where necessary. In 2009, the Environment Agency published the first cycle (2009 to 2015) of RBMPs for England and Wales, reporting the status and objectives of each individual water body. The Environment Agency subsequently published updated RBMPs for England as part of the second cycle (2015 to 2021), as well as providing interim water body classification results via the Catchment Data Explorer. The onshore elements on VE are all within the Essex Combined Management Catchment (see Figure 3.2) in the Anglian river basin district which is reported in the Anglian RBMP (Environment Agency, 2016b).

ECOLOGICAL STATUS OR POTENTIAL

2.2.7 Ecological status or Potential is defined by the overall health or condition of the water body. This is assigned on a scale of High, Good, Moderate, Poor, or Bad, and based on four ecological classification components (e.g. Environment Agency, 2022), as follows:

- Biological: This test is designed to assess the status indicated by biological quality elements such as the abundance of fish, invertebrates, or algae and by the presence of invasive species. The biological quality elements can influence an overall water body status from Bad through to High.
- Physico-chemical: This test is designed to assess compliance with environmental standards for supporting physicochemical conditions, such as dissolved oxygen (DO), phosphorus, and ammonia. The physicochemical elements can only influence an overall water body status from Moderate through to High.
- Specific pollutants: This test is designed to assess compliance with environmental standards for concentrations of specific pollutants, such as zinc, cypermethrin or arsenic. As with the physico-chemical test, the specific pollutant assessment can only influence an overall water body status from Moderate through to High.
- Hydromorphology: For natural, non-HMWBs, this test is undertaken when the biological and physico- chemical tests indicate that a water body may be of High status. It specifically assesses elements such as water flow, sediment composition

and movement, continuity, and structure of the habitat against reference or 'largely undisturbed' conditions. If the hydromorphological elements do not support High status, then the status of the water body is limited to Good overall status. For artificial or HMWBs, hydromorphological elements are assessed initially to determine which of the biological and physico-chemical elements should be used in the classification of ecological potential. In all cases, assessment of baseline hydromorphological conditions are an important factor in determining possible reasons for classifying biological and physico- chemical elements of a water body as less than Good, and hence in determining what mitigation measures may be required to address these failing water bodies.

ADDITIONAL AWB AND HMWB HYDROMORPHOLOGY CONSIDERATIONS

2.2.8 Artificial Water Body (AWB) and Heavily Modified Water Body (HMWB) hydromorphological elements are assessed using a three-stage process, firstly looking at flow, then mitigation measures and biological quality elements.

2.2.9 Flow conditions are assessed initially on a Pass or Fail basis to determine which of the biological and physico-chemical quality elements should be used in the classification of ecological Potential.

2.2.10 Where the flow conditions are unaffected by the physical modification (flow conditions pass), the water body potential is determined by the worst of either the mitigation measures assessment, or any element that is not sensitive to the modified nature of the water body. Where the flow conditions are significantly impacted by the physical modification (flow conditions fail), the water body potential is determined by the worst of any of the Mitigation Measures assessments or the assessment of biological quality elements, physico-chemical quality elements or specific pollutants.

CHEMICAL STATUS

2.2.11 Chemical status is a further classification component defined by compliance with environmental standards for chemicals that are priority substances and/or priority hazardous substances, in accordance with e.g. the Environmental Quality Standards Directive (2008/105/EC). This is assigned on a scale of Good or Fail only. Surface water bodies were historically only monitored for priority substances where there were known discharges of these pollutants; otherwise surface water bodies were reported as being at good chemical status. In recent years the expansion of the number of chemicals assessed, to include parameters such as Polybrominated diphenyl ethers (PBDE) has resulted in an increased number of water bodies failing to meet Good Chemical status.

2.3 WFD ASSESSMENT CONSIDERATIONS

2.3.1 Consideration of WFD requirements is necessary for works which have the potential to cause deterioration in ecological, quantitative and/or chemical status of a water body or to compromise improvements which might otherwise lead to a water body meeting its WFD objectives. Therefore, it is necessary to consider the potential for the proposed activities to impact WFD water bodies, specifically referring to the following WFD requirements, i.e. to:

- Prevent deterioration in status of all surface water bodies (Article 4.1 (a)(i));
- Protect, enhance and restore all surface water bodies with the aim of achieving good surface water status by 2015 or later assuming grounds for time limited derogation (Article 4.1 (a)(ii));

- Protect and enhance all HMWBs/AWBs, with the aim of achieving GEP and GCS by 2015 or later assuming grounds for time limited derogation (Article 4.1 (a)(iii));
- Reduce pollution from priority substances and cease or phase out emissions, discharges and losses of priority hazardous substances (Article 4.1 (a)(iv));
- Prevent or limit the input of pollutants into groundwater and prevent deterioration of the status of all groundwater water bodies (Article 4.1 (b)(i));
- Protect, enhance and restore all groundwater water bodies and ensure a balance between abstraction and recharge of groundwater (Article 4.1 (b)(ii));
- Ensure the achievement of objectives in other water bodies is not compromised (Article 4.8); and
- Ensure compliance with other community environmental legislation (Article 4.9), including specific consideration of water body Protected Areas[2].

2.3.2 The completion of a WFD assessment is a staged process where data on the study area and the project are assessed in the context of the WFD requirements above, to ascertain if the proposals will or will not have a detrimental impact on the status of WFD water bodies. If the assessment concludes, after taking into account the mitigation, that the proposal, may either reduce the quality status of the water bodies or prevent them from reaching the required status, then this represents a failure to achieve the WFD objectives and it should not go ahead unless justification for the new modification is demonstrated under Article 4.7 of the Directive.

2.3.3 In summary the WFD assessment should provide sufficient information for the Environment Agency to be able to determine if the VE proposals have the potential to:

- Cause a deterioration of a water body from its current status or potential (Section 2.4); and/ or
- Prevent future attainment of good status or potential where not already achieved (Section 2.5).

2.4 NO DETERIORATION ASSESSMENT

2.4.1 The definition of WFD Deterioration was clarified following a ruling by the Court of Justice of the European Union (CJEU) in July 2015 (C-461/13):

- “deterioration of the status” of the relevant water body includes a fall by one class of any element of the “quality elements” even if the fall does not result in a fall of the classification of the water body as a whole;
- ‘Any deterioration’ in quality elements in the lowest class constitutes deterioration; and
- Certainty regarding a project’s compliance with the Directive is required at the planning consent stage; hence, where deterioration ‘may’ be caused, derogations under Article 4.7 of the WFD are required at this stage.

[2] The WFD assessment will include deterioration considerations with respect to WFD Protected Areas, however where relevant the detailed impact assessment may sit elsewhere e.g. Habitats Regulations Assessment for consideration of any potential impacts (Likely Significant Effect) on Special Areas of Conservation.

2.4.2 While deterioration within a status class does not contravene the requirements of the WFD, (except for Drinking Water Directive parameters in drinking water protected areas), the WFD requires that action should be taken to limit within-class deterioration as far as practicable. The no deterioration baseline for each water body assessment is taken to be the 2022 status as reported in Section 6.2.

2.4.3 The principle of this assessment is to assess the potential for impact on, and therefore deterioration to, each of the (relevant) WFD supporting elements. Where a potential for impact is identified, the scale of change is considered in the context of the relevant environmental standards for the baseline classification band i.e. if a baseline supporting element is at Good, any potential impact to that supporting element would be characterised in the context of the Good/Moderate classification boundary standard.

2.5 FUTURE STATUS OBJECTIVES

2.5.1 RBMPs are used to outline water body pressures and the actions that are required to address them. The future status objective assessment considers the ability of the development to contribute to WFD objectives for the water body. Assessments in this Project will be based on the mitigation measures assessments, future objectives, and programme of measures set out within the EA's Data Catchment Explorer.

2.5.2 The assessment considers whether the Project has the potential to further exacerbate known pressures (Tier 1 pressures e.g. Physical Modification due to Flood Protection) or the ability for the water body to achieve the current aspiration dates to achieve Good.

2.6 GUIDANCE

2.6.1 There is no designated formal methodology for the assessment of freshwater projects in relation to undertaking WFD compliance assessments in England. There is, however, directly and indirectly applicable guidance, written by the Environment Agency (EA) and Natural Resources Wales (NRW).

2.6.2 The most relevant guidance for this WFD assessment includes:

2.6.3 'Assessing new modifications for compliance with WFD' NEAS Operational Instruction 488_10) (Environment Agency, 2010) - the EA's internal operational instruction which has been produced to guide WFD assessment of new modifications to surface waters.

2.6.4 NRW's guidance 'Complying with the Water Framework Directive Regulations 2017: how to assess and appraise projects and activities' (NRW, 2021) sets out a consistent, transparent and proportionate approach, to conduct WFD (WFD Regulations 2017) compliance assessments that can support legally robust decision making.

2.6.5 The EA's Clearing the Waters For All' (Environment Agency, 2016c) guidance is applicable to estuarine and coastal waters WFD assessments, although many of the principles are still applicable to the general approach applied herein.

2.6.6 The approach is also consistent with PINS Advice Note 18: The Water Framework Directive. In the Advice Note, the Inspectorate supports the preparation and submission of separate WFD assessment reports by Applicants, which clearly explain how the requirements of the WFD have been met. This report outlines the approach to the WFD assessment and clearly demonstrates that the WFD and the 2017 Regulations have been appropriately considered in the assessment of the effects of VE.

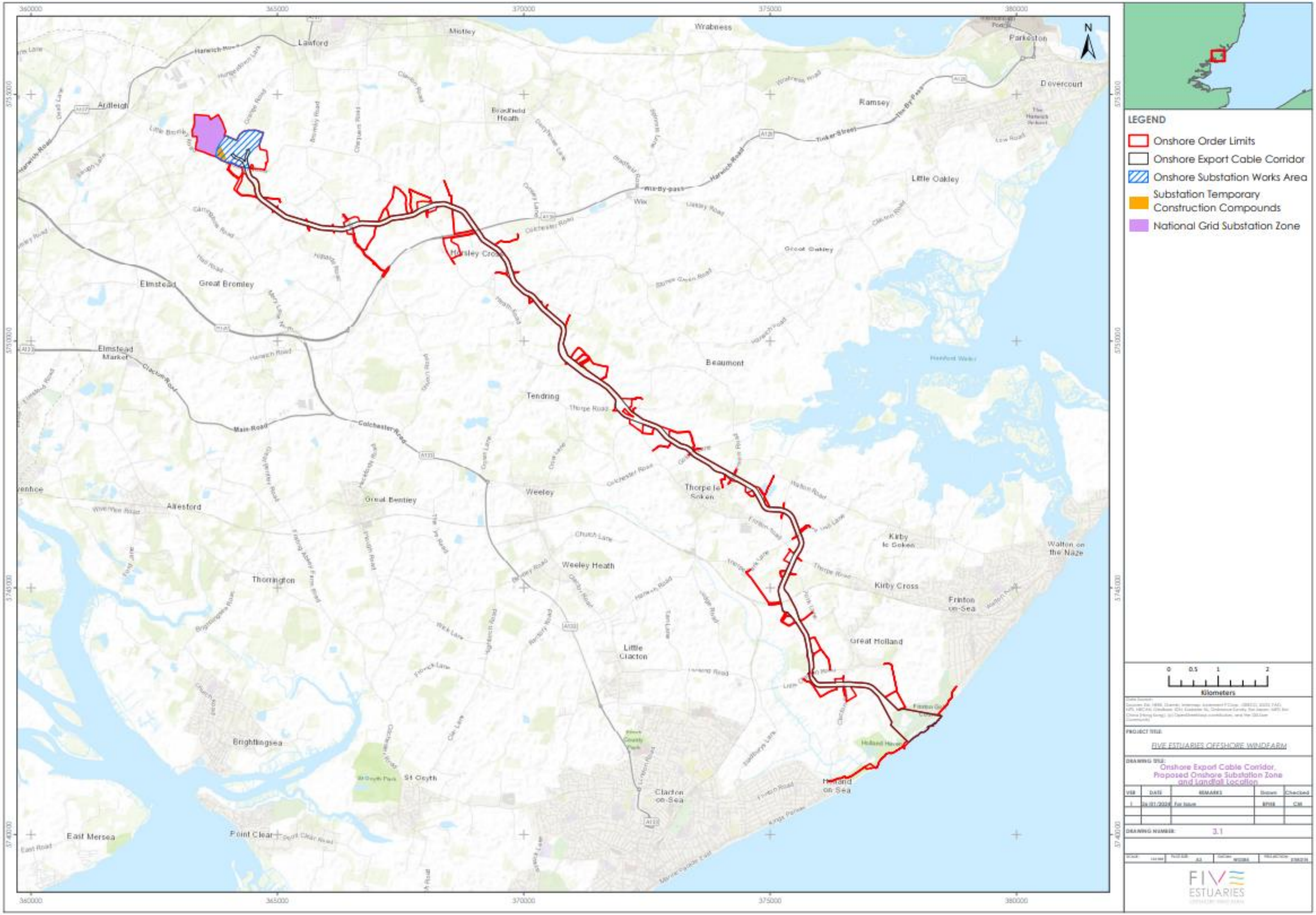
3 PROJECT DESCRIPTION

3.1 OVERVIEW OF ONSHORE ELEMENTS

3.1.1 The onshore elements of VE are located entirely within the administrative boundary of Essex County Council and Tendring District Council (TDC) in south-east England.

3.1.2 The export cable configuration will include up to two cable circuits connecting the offshore substation to the proposed Onshore Substation (OnSS) and into the proposed National Grid East Anglia Connection Node Substation (EACN). The exact location for this is still being considered by NGET at this stage and is subject to a separate consent process.

3.1.3 Figure 3.1 shows the proposed onshore Order Limits for VE, which include the onshore Export Cable Corridor (ECC), OnSS and the landfall location.



LEGEND
Onshore Order Limits
Onshore Export Cable Corridor
Onshore Substation Works Area
Substation Temporary Construction Compounds
National Grid Substation Zone
Kilometers
PROJECT TITLE:
FIVE ESTUARIES OFFSHORE WINDFARM
DRAWING TITLE:
Onshore Export Cable Corridor, Proposed Onshore Substation Zone and Landfall Location
VER
DATE
REMARKS
Drawn
Checked
For Issue
DRAWING NUMBER:
3.1
FIVE ESTUARIES
Mistley
Wrabness
Lawford
Parkeston
Dovercourt
Ardleigh
Ramsey
Bradfield Heath
Little Oakley
Wix
Horsley Cross
Great Oakley
Elmstead
Great Bromley
Elmstead Market
Beaumont
Tendring
Thorpe le Soken
Weeley
Great Bentley
Alresford
Kirby le Soken
Walton on the Naze
Weeley Heath
Thorrington
Kirby Cross
Frinton on-Sea
Great Holland
Little Clacton
Brightlingsea
St Osyth
Clacton on-Sea
Holland on Sea
East Mersea
Point Clear

3.1.4 The onshore aspects of the project are:

- Landfall: the point at which the offshore export cables (below Mean High Water Springs) meet the onshore export cables (above Mean Low Water Springs) within Transition Joint Bays (TJBs). This is presented in Figure 3.1.
- Onshore export cable corridor (ECC): where permanent infrastructure will connect the cables at Landfall to the proposed OnSS and the onwards link to the proposed EACN Substation; and
- Onshore substation (OnSS) where the power supplied from the wind farm is adjusted (including voltage, power quality and power factor as required) to meet the UK System-Operator Transmission-Owner Code (STC) for supply to the EACN Substation.
- Connection to the National Grid will include 400 kV underground circuit(s) running from the proposed VE OnSS to the new NGET EACN Substation**.**

3.1.5 Within these areas, VE will comprise cable circuits and associated infrastructure required to transmit the electricity generated to the National Grid network via a proposed grid connection. The transmission voltage will be up to 400 kV, with a maximum two circuits, and will use High Voltage Alternating Current (HVAC) technology.

3.1.6 The key permanent onshore components of VE will include:

- Infrastructure at landfall where the offshore cables are brought ashore;
- Up to two TJBs connecting the offshore cables to the onshore cables;
- Underground cable ducts, joint pits and cables;
- The construction of the proposed OnSS; and
- Underground cable ducts, joint pits and cables for the grid connection from the proposed OnSS to the proposed EACN.

3.1.7 The onshore cable corridor will be approximately 22 km from the landfall compound to National Grids proposed EACN substation, but cables will be installed in lengths of around 500 to 800m typically. A maximum design scenario length of 24.5 km per circuit of onshore cabling has been included to allow for micrositing within the Onshore ECC.

3.1.8 Along the Onshore ECC a number of off route haul roads are identified, where works access will be required. These generally allow routing of vehicles through existing gaps in the hedgerows or over existing watercourse crossings, which are nearby but not exactly on the Onshore ECC.

3.1.9 To support the operation, operation and maintenance access routes have been defined which generally follow existing farm tracks. These will primarily be used for routine maintenance access to joint pits during operation, with access in 4x4 vehicles or similar.

3.1.10 Table 3.1 summarises key onshore infrastructure information.

Table 3.1. VE onshore infrastructure information

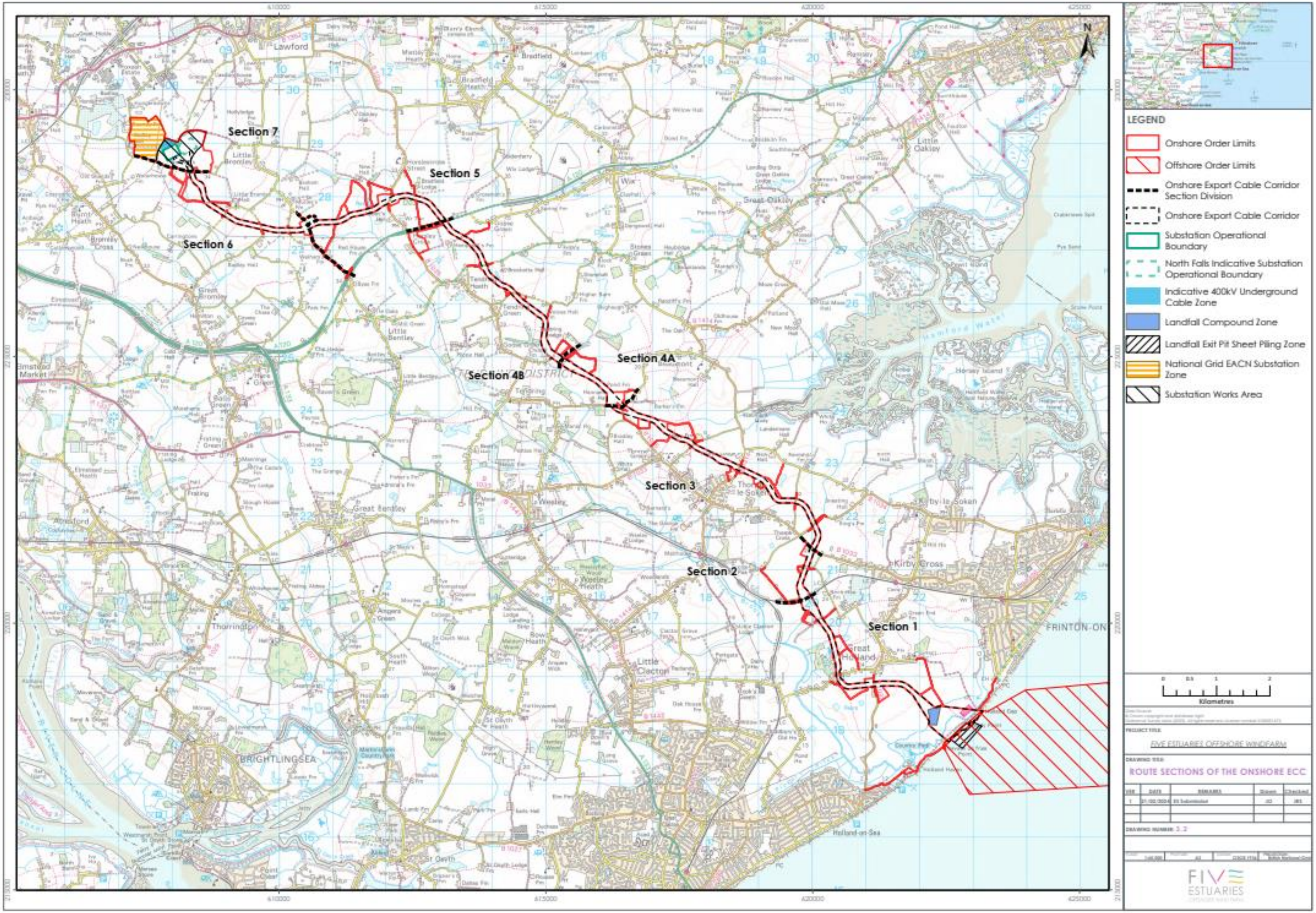
Project Parameter	Maximum Design Scenario
TJB footprint area (area per TJB)	100 m^2
Number of TJBs	Up to 2 (1 per export cable)
Total onshore ECC length	Up to 24.5 km
Number of onshore export cable circuits	Up to 2 (with ducting for additional 2 circuits)
Number of power cables per circuit	3
Number of ducts per circuit	Up to 7 (3 x power cables, 3 x comms. cables and 1 x earth)

3.1.11 Given that the length of the onshore ECC is up to 24.5 km running in a general east-west direction, the DCO boundary has been sub-divided into Route Sections (Figure 3.2) which are as follows:

- Route Section 1 - encompasses the landfall at Sandy Point between Frinton-on-sea and Holland-on-sea. From the Landfall compound, located to the north west of Frinton golf course, adjacent to Short Lane, the onshore ECC continues northward to the Great Eastern Mainline spur between Holland Brook and Pork Lane. The rail line will be crossed using a trenchless crossing technique, such as HDD, which will require a drilling compound to the south of the rail line. Within this section is the provision for three Temporary Construction Compounds (TCCs).
- Route Section 2 - continues north from the Great Eastern Mainline spur between Holland Brook and Pork Lane to the west of Kirby Cross across agricultural fields towards the B1033 (Thorpe Road). There will need to be a trenchless crossing technique, such as HDD, underneath the rail line for the cable. This will require a drilling compound to the north of the railway line. This section includes TCC (TCC no. 3) to service it;
- Route Section 3 - Passes north of the B1033 (Thorpe Road) and the B1034 (Sneating Hall Lane) then continues north-west through agricultural land around Thorpe Le Soken crossing Landermere Road, Golden Lane towards the intersection of Thorpe Road/ Swan Road. This section includes provision for one TCCs (TCC no.4) to the north of Tendring Road, which will be used for access to the section;
- Route Section 4 - Continues northwards from the Thorpe Road/ Swan Road junction, through agricultural fields to the east of Tendring village, passing to the east of Tendring Heath towards the A120 (Harwich Road). This section is divided into Section 4A (south of Tendring Brook) and 4B (north of Tendring Brook);
- Route Section 5 - Extends north from the A120 (Harwich Road) to Bentley Road. Two potential TCC locations (TCCs no.7 and no.8) have been defined either side of Clacton Road to service the parts of the route on either side. The crossings of Clacton Road, Bentley Road as well as the watercourse to the west of Clacton Road will be by trenchless means. A further TCC (TCC no.9) is located to the east of Bentley Road;

- Route Section 6 - Extends from Bentley Road, crossing Payne's Lane, Spratts Lane and Barlon Road to the crossing of Ardleigh Road. Three TCC's (TCC no.11, 10 and 9) have been identified. This section of the onshore ECC will also be used during construction for access to the OnSS; and
- Route Section 7 - Extends north from the crossing of Ardleigh Road to the proposed location of the OnSS and National Grid substation. This section of the onshore ECC will also be used during construction for access to the substation.

3.1.12 These Route Sections have been used in describing the onshore elements of VE and reporting its potential environmental effects. Route Sections do not reflect any proposed phasing of works.



Section 7
Section 6
Section 5
Section 4A
Section 4B
Section 3
Section 2
Section 1
Lawford
Bradfield
Little Oakley
Great Oakley
Wix
Little Bentley
Great Bentley
Thorpe-le-Soken
Kirby-le-Soken
Kirby Cross
Great Holland
Little Clacton
Thorrington
Brightlingsea
Alresford
Holland-on-Sea
Hamford Water
Horsey Island
Frinton-on
LEGEND
Onshore Order Limits
Offshore Order Limits
Onshore Export Cable Corridor Section Division
Onshore Export Cable Corridor
Substation Operational Boundary
North Falls Indicative Substation Operational Boundary
Indicative 400kV Underground Cable Zone
Landfall Compound Zone
Landfall Exit Pit Sheet Piling Zone
National Grid EACN Substation Zone
Substation Works Area
0
0.5
1
2
Kilometres
PROJECT TITLE
FIVE ESTUARIES OFFSHORE WINDFARM
DRAWING TITLE
ROUTE SECTIONS OF THE ONSHORE ECC
DRAWING NUMBER: 3.2
FIVE ESTUARIES

3.2 PROJECT COMPONENTS WITH POTENTIAL TO IMPACT WFD OBJECTIVES

3.2.1 Based on the onshore elements of the VE outlined above (Section 3.1), the activity types which have been considered to have potential to impact WFD receptors (and the ability to achieve WFD objectives) have been identified for consideration within this WFD Compliance Assessment. The following activity types are considered to potentially pose a detrimental risk to the water environment in the absence of mitigation:

- Construction of above ground infrastructure (i.e. onshore cable, landfall and substation);
- Topsoil stripping, excavation and stockpiled earth (including reinstatement);
- Use of oils, chemicals and cement in the vicinity of open water;
- Watercourse crossings (Horizontal Directional Drill (HDD) or alternative trenchless crossing technique);
- Construction and use of construction compounds; and
- Construction and use of temporary access roads.

3.2.2 More detail on key activities is provided below.

CABLE INSTALLATION

3.2.3 Site enabling works will be required before construction within each cable route Section. Site enabling works may include:

- Temporary fencing;
- Upgrade of existing, or installation of new access from the public highways, only where required;
- Archaeological and ecological survey / mitigation works as necessary;
- Utility diversions and installation of temporary site drainage where required;
- Localised vegetation clearance; and
- Establishment of TCC site compounds, which could include site offices, welfare facilities, security, wheel wash, lighting and signage.

3.2.4 Construction activities for each section of the onshore ECC may include:

- Topsoil removal (to edge of working area);
- Temporary haul road installation along all sections of the route;
- Trenchless duct installation beneath complex obstacles (such as major roads, railways, rivers);
- Installation of header or interceptor drains at cable corridor boundaries;
- Trench excavation (up to four, one for each circuit);
- Duct and tile installation;
- Trench backfilling;
- Existing field drainage repairs (where disruption occurs); and
- Jointing pit installation (including French drains to prevent water pooling above jointing pit).

3.2.5 Once the ducts are installed cable installation will commence which includes:

- Cable installation (pulled through ducts from each joint pit);
- Cable jointing; and
- Cable testing and commissioning.

3.2.6 The main cable installation method (e.g. away from watercourses) will be through the use of open-cut trenching with High Density Polyethylene (HDPE) ducts installed, the trench backfilled and cables pulled through the pre-laid ducts.

3.2.7 The cable circuits will be installed within an onshore ECC generally up to 60 m wide during the construction phase, in some places it could be wider. This wider corridor includes space to store topsoil, subsoil and a temporary haul road, as well as any equipment required for that section of work during construction and to accommodate any Public Right of Way (PRoW) diversions required during the construction phase.

3.2.8 In some areas reinstatement can occur as soon as the cable ducts are installed. Activities are expected to consist of:

- Removal of haul road;
- Jointing pit ground re-instatement;
- Replacement of topsoil;
- Landscaping and hedge re-planting, where appropriate; and
- Demobilisation and fence removal.

3.2.9 The cable trenches will be excavated, typically utilising tracked excavators. The excavated subsoil will be stored separately from the topsoil, with the profile of the soil maintained during the storage process, in accordance with best practice. Soil may be stored immediately adjacent to the trench or stored elsewhere within the proposed Order Limits at temporary construction and laydown areas. The nominal width of topsoil affected is up to 60 m for open trenched sections.

3.2.10 The base of the trench will be prepared by laying a base fill material of Cement Bound Sand (CBS). A duct for each cable and separate ducts for a fibre optic bundle will be laid on the base fill material and surrounded with further CBS material before being backfilled with stored subsoil. The stored topsoil will be replaced on top of the backfilled subsoil to reinstate the trench to pre-construction condition, so far as reasonably possible.

3.2.11 Cables will be pulled and installed through the buried ducts and will not require the trenches to be reopened, however access to and from the jointing bays will be required to facilitate the works. Cable pulling is likely to require temporary cable construction compounds alongside the cable route.

ONSHORE SUBSTATION

3.2.12 One OnSS will be required for VE which will be sited North of the A120 on the east side of Colchester.

3.2.13 Site enabling works for the OnSS include initial site clearance. The soil will be stripped and graded as required with material being reused on site where possible. Further information on soil management is provided in Volume 6, Part 3, Chapter 5: Ground Conditions and Land Use. Any excess material will be disposed of at a licenced disposal site. Excavations and laying of foundations, trenches and drainage will commence after grading is complete.

3.2.14 Upon completion of the enabling works and installation of drainage and foundations, the substation platform will be finalised with a layer of stone combined with concrete pour. The exact thickness of the platform will be determined at detailed design stage following the ground investigation.

3.2.15 Foundations for the OnSS may require piling, however, confirmation of the foundation design, including the type and amount of piling is dependent on the ground investigations. Any OnSS piling will be away from watercourses i.e. assumed not to impede on the short or long-term lateral movement of watercourse channels.

3.2.16 Specialist electrical equipment will be delivered to site, installed and commissioned. Due to the size and weight of the transformers' tanks, these deliveries will be classed as Abnormal Indivisible Loads (AILs). Such loads may require specialist delivery methods to be employed and, when on site, offloaded and skidded into position with the use of a mobile gantry crane.

3.2.17 Temporary perimeter fencing will enclose the OnSS for the duration of the construction period, and then during operation a permanent fence will be installed once construction works are complete.

LANDFALL

3.2.18 The landfall denotes the location where the offshore export cables are brought ashore and jointed to the onshore export cables in TJBs (located onshore). There is a clear overlap in the offshore and onshore study area at the intertidal area of the landfall.

3.2.19 The techniques used to carry out the landfall works will be trenchless techniques (such as HDD, micro-tunnelling or auger boring). It may be possible to carry out trenchless techniques beyond the intertidal area and install the rest of the cable using an offshore installation spread. Jack-up barges may be required in the shallow subtidal, the footprints of which are within the overall footprint of disturbance within the cable corridor.

3.2.20 Detailed pre-commencement surveys (such as geophysical, geotechnical, ecological or archaeological surveys) will be carried out before works commence on the landfall. An analysis of the results of these surveys will then inform the final locations of TJBs and the cable route. A recognition of and commitment to micro-siting of cable circuits is intended to provide flexibility to make minor adjustments to the project layouts to accommodate unexpected on-site conditions identified in the pre-construction surveys.

HORIZONTAL DIRECTIONAL DRILL (HDD)

3.2.21 HDD (or other trenchless crossing techniques) will be used at a number of locations as an alternative methodology to open-cut trenching to cross significant environmental and physical features such as main rivers, major drains, roads, and railways.

HAUL ROAD

3.2.22 A temporary haul road will be established along the onshore ECC to provide safe access for construction vehicles; from TCCs to cable installation sites and to reduce impact on the surrounding road network. The temporary haul road could be up to 6 m wide (up to 10 m wide, including verges and drainage channels) and extend the full length of the onshore ECC.

3.2.23 Following topsoil stripping, the temporary haul road will be formed of protective matting, temporary metal road or permeable hardcore aggregate dependent on the ground conditions, vehicle requirements and any necessary protection for underground services.

3.2.24 Alternatives to a traditional aggregate haul road, such as a specialist 'floating' track-way will be considered where appropriate. The final decision will depend upon ground conditions and the contractor's preferred construction strategy and will not be confirmed until the detailed design stage; noting that the final decision will in large part be informed by local ground saturation and potential to disturb soil structure (and generate silt laden runoff) i.e. the final contractor's design will be led by environmental considerations.

TEMPORARY CONSTRUCTION COMPOUNDS

3.2.25 TCCs will be required along the onshore ECC for the duration of the enabling and installation works. The compounds will provide secure, fenced and potentially lit, storage locations for heavy duty plant equipment, local site management offices, welfare, local first aid points, refueling stations, and control of substances hazardous to health (CoSHH) storage as well as providing space for storage of cables, optical fibres, ducts and other supplies required to complete the installation works. Cranes (e.g. mobile gantry cranes) will be used during establishment and decommissioning of each TCC e.g. when taking delivery of AILs.

4 BASELINE ENVIRONMENT

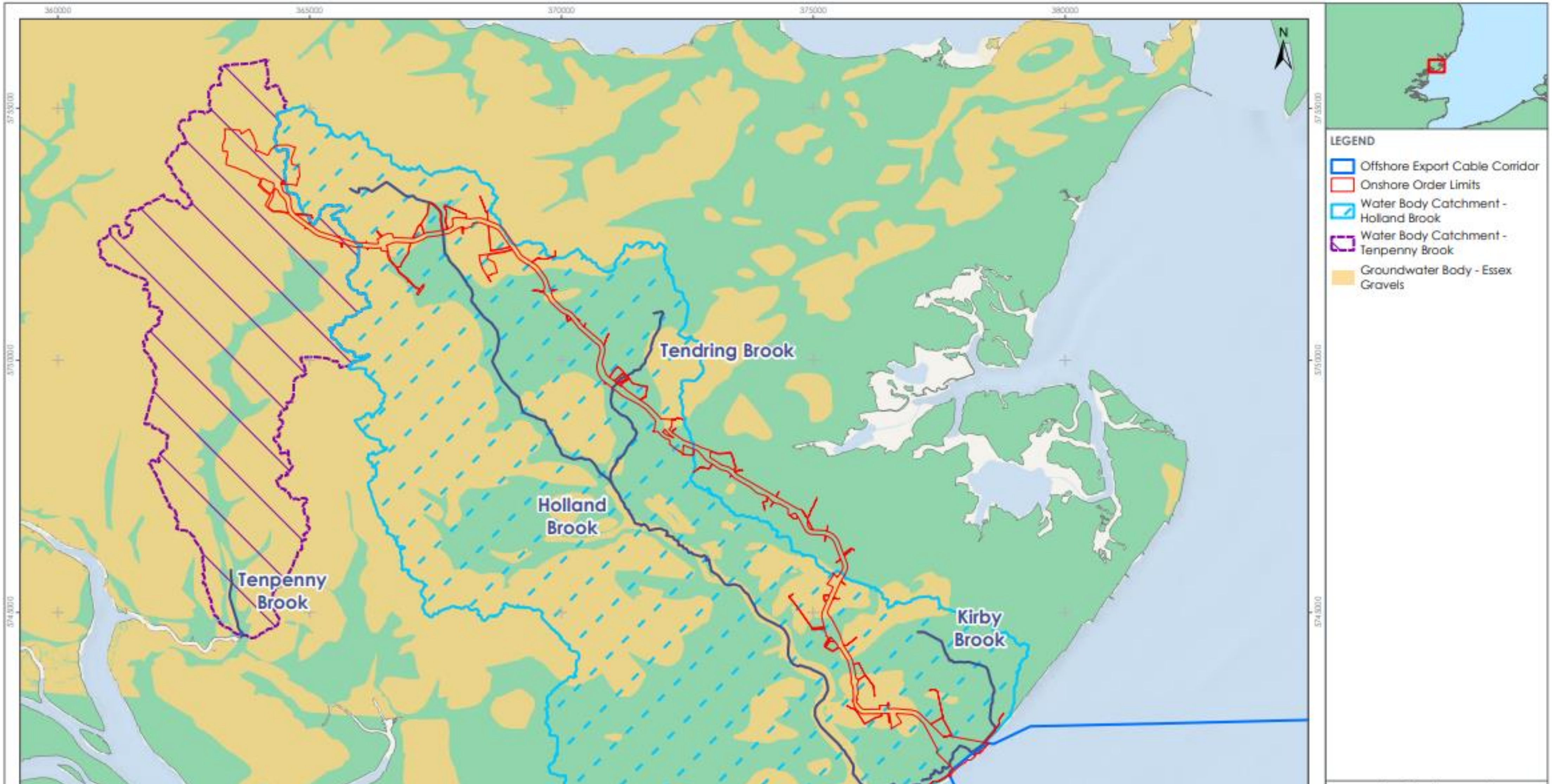
4.1 POTENTIALLY AFFECTED WATER BODIES

4.1.1 Review of the EA Catchment Data Explorer website identified two WFD surface water bodies and one groundwater body in proximity to the Project Site i.e. within a 1 km buffer set around the Onshore ECC (Figure 3.1); as presented in Table 4.1 and Figure 4.1.

Table 4.1: Summary of water body screening considerations

Water body name	Water body type	Screened in	Justification
Holland Brook (GB105037077810)	Main River HMWB	Yes	The onshore ECC intersects the lower reach of Holland Brook immediately upstream of Holland Sluice outfall.
Kirby Brook *(within Holland Brook WFD water body)*	Main River HMWB	Yes	The onshore ECC intersects the lower reach of Kirby Brook at the point where it passes through Holland Haven Country Park to its confluence with Holland Brook. This watercourse falls within the Holland Brook WFD water body.
Tendring Brook *(within Holland Brook WFD water body)*	Main River HMWB	Yes	The onshore ECC crosses Tendring Brook within woodland to the north-east of Tendring. This watercourse falls within the Holland Brook WFD water body.
Beaumont Cut *(Estuarine Ditch network - no directly associated WFD water body).*	Estuarine Ditch network	No	The onshore ECC extends into the 'headwaters' catchment area of this estuarine ditch network immediately south of Swan Road. The ECC does not intersect the Main River reach of Beaumont Cut. Screened out given distance from Beaumont Cut, and lack of feasible pathways for potential impact on

Water body name	Water body type	Screened in	Justification
			subsequent / downstream estuarine water body.
Tenpenny Brook (GB105037041310)	Main River HMWB	Yes	The land north-west of the ECC, north of Great Bromley, is drained by tributaries of Tenpenny Brook which flow south from the onshore ECC, joining Tenpenny Brook at Great Bromley
Essex Gravels Water Body (GB40503G000400)	Groundwater	Yes	This groundwater body underlies sections throughout the ECC.



PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:

Water Framework Directive Waterbodies

VER	DATE	REMARKS	Drawn	Checked
1	[illegible]/01/2024	For Information	BPHR	CH

DRAWING NUMBER: 4.1

FIVE ESTUARIES

4.1.2 The ECC extends north-west from landfall, roughly parallel to and north of Holland Brook. The ECC intersects the lower reach of Holland Brook immediately upstream of Holland Sluice outfall. Tendring Brook crosses through the ECC to the north of Tendring village and continues south-west draining into Holland Brook. Kirby Brook meanders parallel to the coastline crossing the entire width of the southernmost section of the onshore ECC.

4.1.3 The Essex gravel groundwater body underlies the onshore ECC route. The water body is not used for public water supply but does support a number of uses including a significant number of small domestic supplies. It is classified as secondary aquifer.

4.1.4 The VE Order Limits also crosses several existing field drains, ditches and irrigation channels. Most of the surface water channels crossed are ordinary watercourses and form tributaries to the Main River watercourses detailed above. The exception to this is land to the north-west of the ECC, north of Great Bromley. This land is drained by tributaries of Tenpenny Brook which flow south from the onshore ECC, joining Tenpenny Brook at Great Bromley. Tenpenny Brook continues south, draining into Colne Estuary approximately 10 km downstream of the ECC.

4.2 RELEVANT WATER BODY STATUS

4.2.1 The overall, ecological and chemical status of the surface water bodies listed in Table 4.2 has been established using the Environment Agency's catchment data explorer (Environment Agency, 2022).

4.2.2 In addition to the ecological status classification, the biological, physico-chemical, hydromorphological and specific pollutants supporting element classifications have also been extracted to ensure that the activities associated with VE, as outlined in Section 3.2, are assessed against each of these elements and will not compromise the objectives of the WFD resulting in a non-compliant assessment. Table 4.2 –Table 4.4.

4.2.3 highlight the recent classifications (Environment Agency, 2022). These tables (and specifically the 2022 classification) form the baseline conditions against which consideration of the VE activities is made.

Table 4.2: Holland Brook (GB105037077810) water body classification

Parameter		2019	2022
Water body ID	GB105037077810		
Water body length	21.07 km		
Water body type	HMWB		
Overall Water body		**Moderate**	**Moderate**
Ecological, chemical or quantitative status	**Ecological**	**Moderate**	**Moderate**
Biological supporting elements	Fish	**Poor**	**Poor**
	Invertebrates	**Poor**	**Poor**
	Macrophytes	**Poor**	**Poor**
Physico-chemical quality elements	Ammonia (Phys-Chem)	**High**	**High**
	Dissolved oxygen	**High**	**Good**
	pH	**High**	**High**
	Phosphate	**Moderate**	**Poor**
	Temperature	**High**	**High**
Hydromorphological Supporting Elements	Hydrological Regime	**Supports good**	**Supports good**
Supporting Elements	Mitigation Measures assessment	**Moderate or less**	**Moderate or less**
Ecological, chemical or quantitative status	**Chemical**	**Fail**	**Does not require assessment**
Chemical supporting elements	Priority substances	**Good**	**Does not require assessment**
	Priority hazardous substances	**Fail**	**Does not require assessment**
Priority Hazardous Substances (subset i.e. failing elements)	Polybrominated diphenyl ethers (PBDE)	**Fail**	**/**
	Mercury and Its Compounds	**Fail**	**/**

Table 4.3: Tenpenny Brook (GB105037041310) water body classification

Parameter		2019	2022
Water body ID	GB105037041310		
Water body length	1.467 km		
Water body type	HMWB		
Overall Water body		**Moderate**	**Moderate**
Ecological, chemical or quantitative status	**Ecological**	**Moderate**	**Moderate**
Ecological supporting elements	Fish	**Poor**	**Poor**
	Invertebrates	**Moderate**	**Moderate**
	Macrophytes	**Good**	**Good**
Physico-chemical quality elements	Ammonia (Phys-Chem)	**High**	**High**
	Dissolved oxygen	**High**	**High**
	pH	**High**	**High**
	Phosphate	**Bad**	**Bad**
	Temperature	**High**	**High**
Hydromorphological Supporting Elements	Hydrological Regime	**Supports good**	**Supports good**
	Mitigation Measures Assessment	**Good**	**Good**
Ecological, chemical or quantitative status	**Chemical**	**Fail**	**Does not require assessment**
Chemical supporting elements	Priority substances	**Good**	**Does not require assessment**
	Priority hazardous substances	**Fail**	**Does not require assessment**
Priority Hazardous Substances (subset i.e. failing elements)	Polybrominated diphenyl ethers (PBDE)	**Fail**	**/**
	Mercury and Its Compounds	**Fail**	**/**

Table 4.4: Essex Gravels (GB40503G000400) water body classification

Parameter		2022
Water body ID	GB40503G000400	
Water body surface water	1274.639 km2	
Water body type	Groundwater Body	
Overall Water body		**Poor**
Ecological, chemical or quantitative status	**Quantitative**	**Moderate**
Quantitative Status element	**Quantitative Status element**	**Good**
	Quantitative Dependent Surface Water Body Status	**Good**
	Quantitative GWDTEs test	**Good**
	Quantitative Saline Intrusion	**Good**
	Quantitative Water Balance	**Good**
Chemical (GW)	**Chemical Status element**	**Poor**
	Chemical Dependent Surface Water Body Status	**Good**
	Chemical Drinking Water Protected Area	**Good**
	Chemical GWDTEs test	**Good**
	Chemical Saline Intrusion	**Good**
	General Chemical Test	**Poor**
Supporting elements (Groundwater)	**Prevent and Limit Objective**	**Active**
	Trend Assessment	**No trend**

4.2.4 The majority of surface water bodies that could be affected by VE are HMWBs (Table 4.2). The objective for these water bodies is therefore 'Good Ecological Potential'. Ecological potential in artificial and heavily modified water bodies is, in part, determined by an assessment of whether measures are properly in place to mitigate the impacts of any modification on the ecology of the water body. In WFD classification, this is referred to as the mitigation measures assessment. If all mitigation measures are in place, the water body would (provisionally) be classified as being at good potential. If one or more identified mitigation measures are absent, the water body would be classified at moderate potential. In both cases, if appropriate biological or chemical classifications are assessed to be at worse than good then the potential of the water body is classified by the worst scoring element according to the usual one-out-all-out procedure.

4.2.5 Table 4.5 summarises the morphological mitigation measures assessment. It is a requirement of the WFD compliance assessment to determine whether the project will compromise the achievement of the WFD objectives by inhibiting the effectiveness of these measures and preventing the achievement of the objectives in the relevant HMWBs.

4.2.6 The Anglican RBMP recognises that without a programme of measures to address significant water management measures, 55% of surface waters would deteriorate by 2027 (end of the third river basin management cycle) due to unmitigated physical modifications and invasive non-native species spread. The importance of measures to address physical modifications and morphological pressures is therefore critical and these pressures will increase through the effects of climate change and population growth resulting in greater demands from flood protection, land drainage and the spread of urban areas.

Table 4.5: Mitigation Measures Assessment

Water body	Morphological mitigation measure	Status
Holland Brook (GB105037077810)	Physical modifications due to flood protection and land drainage. (Further associated physical modification SWMIs associated with barriers (ecological discontinuity), and Land drainage – structures.	Moderate
Tenpenny Brook (GB105037041310)	Physical modifications due to barriers causing ecological discontinuity. It is also suspected that modifications may be due to flood protection structures.	Good
Essex Gravels Water Body (GB40503G000400)	SWMI for this groundwater body relates to diffuse sources. Measures include those to address poor nutrient management and poor livestock management.	Moderate

4.3 PROTECTED AREAS

4.3.1 In addition to the WFD, a number of waters in the Anglian River Basin District are protected under other existing European Union legislation requiring special protection due to their sensitivity to pollution or their particular economic, social or environmental importance. All of the areas requiring special protection in the Anglican River Basin District have been identified by EA, then mapped and listed in a register of protected areas (required under Article 5 of the WFD Directive). The register of protected areas includes:

- Drinking Water Areas;
- Economically Significant Waters;
- Recreational Waters;
- Nutrient Sensitive Areas;
- Special Protection Areas (SPAs); and
- Special Areas of Conservation (SACs).

4.3.2 Protected areas are the areas of land and bodies of water that have specific uses which require special protection. These include waters used for drinking water, bathing (recreational waters), commercial shellfish harvesting (economically significant), nutrient sensitive (both in terms of the Urban Wastewater Treatment Directive and the Nitrates Directive) and those that sustain the most precious wildlife species and habitats (Natura 2000 sites). These areas have legally binding objectives in place that protect those uses from potentially harmful activities and new developments.

4.3.3 Table 4.6 - Table 4.7 list the protected areas for those water bodies screened into the assessment.

Table 4.6: Holland Brook Protected Areas

Protected Area Name	Id	Directive
Sandlings and Chelmsford	G78	Nitrates Directive
Holland Brook NVZ	S438	Nitrates Directive

Table 4.7: Tenpenny Brook Protected Areas

Protected Area Name	Id	Directive
Sandlings and Chelmsford	G78	Nitrates Directive
Essex Estuaries	UK0013690	Special Area of Conservation
Colne Estuary (Mid-Essex Coast Phase 2)	UK9009243	Special Protection Area
Colne Estuary (Mid-Essex Coast Phase 2)	UK11015	Ramsar Site
Tenpenny Brook NVZ	S435	Nitrates Directive

Table 4.8: Essex Gravels Water Body Protected Areas

Protected Area Name	Id	Directive
Crouch NVZ	S425	Nitrates Directive
Sandlings and Chelmsford	G78	Nitrates Directive
River Blackwater NVZ	S434	Nitrates Directive
Outer Thames Estuary	UK9020309	Special Protection Area
River Roach, Nobles Ditch and Eastwood Brook NVZ	S427	Nitrates Directive
Thames Estuary & Marshes	UK9012021	Special Protection Area
Thames Estuary & Marshes	UK11069	Ramsar Site
Dengie (Mid-Essex Coast Phase 1)	UK11018	Ramsar Site
Essex Estuaries	UK0013690	Special Area of Conservation
Blackwater Estuary (Mid-Essex Coast Phase 4)	UK11007	Ramsar Site
Dengie (Mid-Essex Coast Phase 1)	UK9009242	Special Protection Area
Blackwater Estuary (Mid-Essex Coast Phase 4)	UK9009245	Special Protection Area
Virley Brook	S430	Nitrates Directive
Stour And Orwell Estuaries	UK9009121	Special Protection Area
River Chelmer NVZ	S428	Nitrates Directive
Roding (Cripsey Brook to Loxford Water) NVZ	S441	Nitrates Directive
Lower Stour NVZ	S424	Nitrates Directive
Mardyke NVZ	S442	Nitrates Directive
Hamford Water	UK9009131	Special Protection Area
Hamford Water	UK11028	Ramsar Site
Colne Estuary (Mid-Essex Coast Phase 2)	UK9009243	Special Protection Area
Colne Estuary (Mid-Essex Coast Phase 2)	UK11015	Ramsar Site
Tenpenny Brook NVZ	S435	Nitrates Directive

Protected Area Name	Id	Directive
LOWER STOUR NVZ	S662	Nitrates Directive
Stour And Orwell Estuaries	UK11067	Ramsar Site
Ramsey River NVZ	S421	Nitrates Directive
Southminster Ditches NVZ	S426	Nitrates Directive
Southall Sewer and Runningwater Brook NVZ	S802	Nitrates Directive
Colne NVZ	S437	Nitrates Directive
Ingrebourne NVZ	S440	Nitrates Directive
COASTAL STREAMS TO CROUCH ESTUARY NVZ	S663	Nitrates Directive
Salary Brook NVZ	S436	Nitrates Directive
Abberton Reservoir	UK9009141	Special Protection Area
Layer Brook NVZ	S431	Nitrates Directive
Holbrook NVZ	S422	Nitrates Directive
Crouch & Roach Estuaries (Mid-Essex Coast Phase 3)	UK9009244	Special Protection Area
Roman River NVZ	S433	Nitrates Directive
Belstead Brook NVZ	S410	Nitrates Directive
Holland Brook NVZ	S438	Nitrates Directive
Benfleet And Southend Marshes	UK11006	Ramsar Site
Abberton Reservoir	UK11001	Ramsar Site
Spickets Brook NVZ	S429	Nitrates Directive
Roman River NVZ	S432	Nitrates Directive
Crouch & Roach Estuaries (Mid-Essex Coast Phase 3)	UK11058	Ramsar Site
Foulness (Mid-Essex Coast Phase 5)	UK11026	Ramsar Site
Essex Gravels	UKGB40503G000400	Drinking Water Protected Area
Benfleet And Southend Marshes	UK9009171	Special Protection Area
Stutton Brook NVZ	S423	Nitrates Directive

5 PRELIMINARY WFD SCOPING ASSESSMENT

5.1 SCOPING ASSESSMENT INTRODUCTION

5.1.1 At the scoping phase each of the project activities is considered to identify potential interactions and pathways for potential impact on individual WFD quality elements.

5.1.2 The scoping assessment has been applied for each activity type listed in section 3.2. The potential impacts for each activity are identified below which has informed the selection of the activities to be scoped into the assessment. The outcome of this initial assessment is summarised in Table 5.1.

5.2 CONSTRUCTION PHASE WFD IMPACT PATHWAY CONSIDERATIONS

CABLE ROUTE INSTALLATION

5.2.1 The preparation of the VE onshore cable corridor to facilitate construction will include multiple enabling works activities (Section 3) e.g. erecting temporary fencing along the onshore cable corridor progressively along its length. Each route section (see Figure 3.2) will then be subject to construction phase activities (Section 3) including topsoil removal, temporary haul road installation, trenchless duct installation beneath complex obstacles and trench excavation and backfilling. The associated pathways for potential impact on WFD receptors are set out below.

GENERATION OF TURBID OR POLLUTED RUNOFF WHICH COULD ENTER THE WATER ENVIRONMENT

5.2.2 The construction, operation and reinstatement of the ECC has the potential to generate sediment laden runoff. Potential sources of fine sediment during the construction phase include:

- Topsoil from areas currently in agricultural use will be stripped at the start of general construction works, which poses the risk of soil exposure and increased risk of sediment laden runoff, which in turn could reach surface water courses;
- Stockpiling of soils can also generate sediment laden runoff if not stored correctly;
- Increased vehicle movements along the ECC have the potential to disturb surfaces (with potential to generate silt laden runoff);
- Localised vegetation clearance may be required along the ECC route which could have potential to disturb surfaces and result in increased sediment laden runoff; and
- Establishment of TCC site compounds (e.g. site offices, welfare facilities, security, wheel wash, lighting and signage) pose the risk of generating sediment laden and other pollution runoff if suitable preventative measures are not put in place.

5.2.3 Suspended sediment (sediment laden) runoff, if allowed to enter surface watercourses can have a negative impact on water quality, water dependant habitats and aquatic ecology. Suspended solids within surface water bodies may have an effect on:

- The survival of fish eggs in gravel beds or spawning grounds as a result of deoxygenation caused by sediment deposition (interstitial clogging);
- The survival of plants and algae by smothering; and
- The survival of young fish and aquatic invertebrates such as mayfly larvae through gill damage from sediment particles.

5.2.4 Once a sediment load enters a river it can result in long-term changes that cause chronic harm. Sediment can cause river hydromorphological changes, which in turn change the flow dynamics of the river (and habitats) into the future. Both bed and suspended materials, and subsequent changes in channel form associated with changes in sediment supply, may affect e.g. benthic invertebrates in many ways at various stages in their life cycle.

5.2.5 Sediment inputs can cause direct and indirect harm to benthic invertebrate populations. Indirect effects can be caused by sediment that infiltrates the river bed and decreases oxygen supply in interstitial areas, affecting juvenile benthic invertebrate (and juvenile fish) habitats.

5.2.6 Introduced sediments can subsequently provide a medium for macrophyte growth. Macrophytes can smother the river substrate and habitat further, and can trap more sediment which exacerbates the problem in the long term.

5.2.7 There is also the risk of and release of other pollutants from fuel and chemical stores and any plant and machinery.

5.2.8 The construction compounds will also have welfare facilities and adequate sewage facilities will be required so as not to impact on water quality. Additional facilities will need to be provided along the onshore cable corridor to ensure appropriate collection and treatment of sewage is undertaken so as not to impact on the aquatic environment i.e. prevent polluting discharges with e.g. high BOD and ammonia concentrations.

5.2.9 The use of cement and concrete in the construction of the hardstanding areas and associated infrastructure has the potential to impact upon water quality. Fresh concrete and cement is highly alkaline and therefore is likely to affect water quality if washed into the water courses along the VE onshore cable corridor. Irresponsible use of concrete in an uncontained environment poses a risk to aquatic species such as invertebrates and fish. Oils and petroleum can also have large impacts on aquatic species, and depending on the extent of a spill, may reduce respiration rates by altering oxygen exchange at the water-air interface or cause complete elimination of invertebrates and fish from streams.

5.2.10 There is also a potential to alter drainage pathways with e.g. drainage ditches shortened or straightened resulting in faster delivery of water from the working corridor to water courses with possible changes to the flow regime which could result in impacts to biology and morphology through pressures such as scouring.

POTENTIAL FOR DAMAGE TO FLOOD DEFENCES OR SURFACE WATER DRAINAGE INFRASTRUCTURE

5.2.11 The onshore ECC assets are defined by the EA as flood defences on the coastline at landfall, and along the embankments of Kirby Brook, Holland Brook and Tendring Brook. At any crossing point there will be potential for the construction works associated with the crossing to damage or alter the nature of the flood defence, potentially increasing flood risk and/or morphological change.

DISRUPTION OF FLOWS OR POLLUTION TO GROUNDWATER THROUGH GROUND EXCAVATIONS OR PILING

6.1.1 There are no known point sources of contamination within the VE Order Limits, however, on a precautionary basis, there is the potential for limited contamination to exist as a result of previous land uses, including agriculture and the use of nitrogen-based fertilisers. Any contamination is likely to be localised in its extent given the sources of contaminants and the characteristics of the underlying geology.

ONSHORE SUBSTATION CONSTRUCTION

5.2.12 The OnSS (Section 3.2) will contain a number of elements including switchgear, busbars, transformers, capacitors, reactors, reactive power compensation equipment, filters, cooling equipment, control and welfare buildings, lightning protection rods (if required) and internal road access. A security fence will surround the OnSS compound, and full design details will be provided at detailed design stage.

GENERATION OF TURBID OR POLLUTED RUNOFF WHICH COULD ENTER THE WATER ENVIRONMENT

5.2.13 Construction works may generate silt arisings which if allowed to reach watercourses could have a localised impact on e.g. suspended sediment and phosphate concentrations (depending on the phosphate loading within the silt). Without mitigation, the construction phase has the potential to generate adverse effects on the water environment – associated with decreased water quality, increased pollution potential and alterations to existing ecological conditions (as above).

5.2.14 The use of vehicles or machinery requiring fuel or hydraulic oil may also pose a risk (via accidental spillage) of hydrocarbons (including WFD PHS substances such as benzo(a)pyrene at a localised scale). Depending on the scale of spillage, this could have a short/long-term effect on water quality of surrounding water bodies.

DISRUPTION OF FLOWS OR POLLUTION TO GROUNDWATER THROUGH GROUND EXCAVATIONS OR PILING

5.2.15 There is potential for piled foundations being required as part of the OnSS design, subject to post–consent ground investigations. The OnSS zone is in agricultural land and there is no record of any potentially contaminated land on these parts of the site.

5.2.16 Piling can represent an obstacle to groundwater movement, however any impediment is likely to be highly localised and shallow i.e. not affecting the deeper WFD water body. It is assumed that any piling will be at sufficient distance from watercourses to not represent a short or long term impediment to any lateral channel movements.

WATER CROSSINGS USING TRENCHLESS TECHNIQUES (E.G. HDD)

5.2.17 The Watercourse Crossing Register (Appendix B – Extract from the Watercourse Crossings Register comprises a table noting the identified watercourses along the cable route that will be crossed by the onshore ECC. The list of watercourses where trenchless techniques, such as HDD, has been committed to be used to cross them. The most suitable method for crossing obstructions will be determined during the construction stage of the project which may identify additional trenchless crossings.

5.2.18 HDD (or other trenchless crossing techniques) will be used at a number of locations to cross significant environmental and physical features such as main rivers, major drains, roads, and railways.

GENERATION OF TURBID OR POLLUTED RUNOFF WHICH COULD ENTER THE WATER ENVIRONMENT

5.2.19 Several sections of the onshore ECC necessitate cable crossings of Main Rivers, ordinary watercourses or drainage ditches, as shown in Figure A.1 under Appendix A - Figures and listed in the Watercourse Crossing Register (Appendix B – Extract from the Watercourse Crossings Register).

5.2.20 HDD (or other trenchless crossing) techniques present a risk of indirectly contaminating surface watercourses or groundwater where they are hydraulically connected with surface runoff caused by spillages and the movement of excavated earth/ sediments.

5.2.21 Trenched crossings are proposed for smaller watercourses only, see Watercourse Crossing Register (Appendix B – Extract from the Watercourse Crossings Register, which nonetheless also represents a risk of silt laden runoff entering the surface water network.

POTENTIAL FOR DAMAGE TO FLOOD DEFENCES OR SURFACE WATER DRAINAGE INFRASTRUCTURE

5.2.22 HDD (or alternative trenchless crossing technique) crossings will be employed for larger surface watercourses; key roads; and some utility crossings.

5.2.23 HDD techniques present a risk of indirectly contaminating surface watercourses or groundwater where they are hydraulically connected with surface runoff caused by spillages (including accidental breakout) and the movement of excavated earth/ sediments.

DISRUPTION OF FLOWS OR POLLUTION TO GROUNDWATER THROUGH GROUND EXCAVATIONS OR PILING

5.2.24 Where groundwater is encountered it will be sensitive to accidental spillages and runoff from the trenchless crossing works. This has the potential to impact water quality of underlying ground water bodies during construction phase. It is noted that HDD operations will be relatively shallow (10's of metres) and are likely to only intercept with shallow/surface groundwaters. It is also anticipated that drill fluids will be of the modern 'self-sealing' type which will minimise risk of breakouts.

LANDFALL INSTALLATION

5.2.25 The offshore export cables will make landfall at Sandy Point, to the north west of the golf course, adjacent to Short Lane between Holland-on-Sea and Frinton-on-Sea on the Essex coast. The works at the landfall include construction of the landfall compound, HDD works (or other suitable alternative trenchless techniques such as micro-boring) including temporary construction of HDD exit pits in the intertidal or shallow subtidal, intertidal trenching (this will only be required if the exit pits are located in the intertidal zone) and construction of TJBs.

GENERATION OF TURBID OR POLLUTED RUNOFF WHICH COULD ENTER THE WATER ENVIRONMENT

5.2.26 Construction works may generate silt arisings which if allowed to reach watercourses could have a localised impact on e.g. suspended sediments and phosphate concentrations (as per above impact descriptions).

5.2.27 Landfall HDD (or other trenchless crossing technique) exit pits may be located within the intertidal zone or the shallow subtidal zone. Depending on the final methodology and location, it may be necessary to install temporary sheet piled exit pits to prevent water intrusion to provide a dry working area and to temporarily retain drilling fluid (e.g. bentonite if required).

5.2.28 The use of vehicles or machinery requiring fuel or hydraulic oil may also pose a risk (via accidental spillage) in terms of hydrocarbons entering surface watercourses at a localised scale – including WFD Priority Hazardous Substances such as e.g. benzo(a)pyrene.

5.2.29 Should a tidal flood event associated with extreme sea levels occur whilst construction works are in progress, there is the potential for stored materials (e.g. stockpiled soils and excavated material) to be mobilised by the floodwaters and washed into coastal waters, potentially resulting in localised effects on tidal water quality.

POTENTIAL FOR DAMAGE TO FLOOD DEFENCES OR SURFACE WATER DRAINAGE INFRASTRUCTURE

5.2.30 The landfall works will include up to 3 bores (one per circuit plus one spare) to cross the coastal flood defence line and Kirby Brook watercourse. HDD techniques present a risk of indirectly contaminating surface watercourses or groundwater where they are hydraulically connected with surface runoff caused by spillages (including accidental breakout) and the movement of excavated earth/ sediments (drilling fluid is however inert and not anticipated to be an issue).

DISRUPTION OF FLOWS OR POLLUTION TO GROUNDWATER THROUGH GROUND EXCAVATIONS OR PILING

5.2.31 For the landfall trenchless crossing, the quality of the groundwater is likely to be affected with elevated levels of salinity, which may reduce its importance/ sensitivity. This has the potential to impact water quality of underlying ground water bodies during the construction phase.

5.3 OPERATIONAL PHASE WFD IMPACT PATHWAY CONSIDERATIONS

5.3.1 The Operational and Maintenance (O&M) requirements for the onshore elements of VE will be largely preventative, accompanied by infrequent on-site inspections of the onshore transmission infrastructure. However, the onshore infrastructure will be consistently monitored remotely, and there may be O&M staff visiting the OnSS to undertake works on a regular basis (expected to be once per week). The OnSS will not be manned, and lighting will only be required during O&M activities.

ONSHORE SUBSTATION

CHANGES TO SURFACE WATER DRAINAGE AT THE ONSHORE SUBSTATION LOCATION

5.3.2 The presence of the OnSS and permanent access route would result in an increase in impermeable surfacing (compared to pre-scheme baseline). The maximum footprint of the substation compound would be 280 m by 210 m. The majority of the compound would remain permeable. Through the introduction of impermeable and semi-impermeable surfaces associated with the substation building and access track, there is a potential increase in the volume and rate of runoff (associated with reduced infiltration potential to ground).

5.3.3 An increase in volume and rate of surface water runoff can have potential impacts such as producing in-channel scour, changes in water quality and local habitat change in the surrounding water bodies, potentially impacting the ecological and chemical supporting elements of a water body.

PERMANENT CABLE ROUTE INFRASTRUCTURE AND TRENCHLESS CROSSINGS

5.3.4 The onshore cable would be buried underground. Full restoration of land above the cables would be included in the construction phase, ensuring that the former land use is retained.

5.3.5 Following construction, the trenchless crossing work areas would be restored, with the former land use retained. The only permanent features on the surface of the onshore ECC would be the infrequent jointing bays. Thus, there are very limited potential pathways for impact on WFD elements. Further to the unplanned maintenance discussion below potential impacts from the permanent cable infrastructure are scoped out.

GENERATION OF TURBID RUNOFF WHICH COULD ENTER THE WATER ENVIRONMENT

5.3.6 Unplanned maintenance may involve the repair of onshore cable faults. Typically, this involves excavating two adjacent pits, pulling the cable back through the ducting and pulling a new cable through. Alternatively, the area of the fault may be excavated (with an additional up to 40 m in both directions) and two new joints installed within this area. Methods for excavation and reburial would be similar to the original installation.

5.3.7 Repairs of the onshore cable (unmitigated) have the potential to impact the water quality of the water bodies on site (e.g. via sediment laden runoff where repairs require excavations in close proximity to watercourses). Any such unplanned repair activities are considered non-routine and unlikely / highly infrequent; and they would be undertaken under separate, future authorisations during which the site specific method statements and potential for local WFD impact would be assessed (at that time). Potential impacts are therefore scoped out of this assessment.

5.4 DECOMMISSIONING PHASE WFD IMPACT PATHWAY CONSIDERATIONS

5.4.1 No decision has yet been made regarding the final approach to decommissioning for VE as it is recognised that industry best practice, rules and legislation change over time. The detail and scope of decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator with a decommissioning plan provided.

5.4.2 Closer to the time of decommissioning, it may be decided that removal of infrastructure, such as the cable circuits, would lead to a greater environmental impact than leaving some components *in-situ*. In this case it may be proposed that cable circuits, cable ducts and landfall infrastructure are to remain *in-situ* where appropriate and any requirements for decommissioning at the Landfall will follow the appropriate regulatory regime.

5.4.3 If removal of infrastructure does take place, the dismantling of the onshore substation and landfall would have the potential to cause adverse impacts on surrounding watercourses and receptors. The use of heavy vehicles and the physical removal of the infrastructure may lead to an increase in turbid runoff, with potential to impact water quality (in turn WFD classification) in surrounding watercourses.

DECOMMISSIONING OF CABLE ROUTE

5.4.4 With respect to the buried onshore cables, these may be left in place during decommissioning. Allowing the cables to remain in place is considered an acceptable option with minimal environmental impact. TJBs may be removed, depending on agreements reached with the regulatory authorities and landowners in place at the time. Removal of TJB structures would return the site to its pre-development state.

DECOMMISSIONING OF ONSHORE SUBSTATION

6.1.2 It is anticipated that the OnSS would be gradually dismantled on site with certain infrastructure removed for recycling or reuse. Following this, the area is likely to be remediated and restored.

6.1.3 The decommissioning works may involve removal of some or all of the impermeable hard-standing surfacing and restoration of the permeable greenfield land present prior to construction. This action would result in the greenfield run-off rates being returned to their pre-development state.

6.1.4 Removal of scheme infrastructure (e.g. substation removal) will involve construction type activities, with potential for some temporary exposed soils, but on a smaller scale than the equivalent construction phase activities. The decommissioning activities will be undertaken under similar environmental monitoring plans (equivalent to the Code of Construction Practice (CoCP)) and associated mitigation measures (including pollution prevention measures). Therefore, the WFD impact pathways would be similar to the construction phase activities scoped into this assessment, with the scale of potential impact (likely) reduced compared to the construction phase.

Table 5.1: Activities associated with VE and outcome of preliminary scoping assessment for the WFD compliance assessment.

Activity	Biological supporting elements				Hydro-morphological supporting elements		Physico-chemical supporting elements	Chemical		GW	
	Fish	Invertebrates	Macrophytes	Macrophytes and Phytobentos combined	Hydrological Regime	Morphology		Priority hazardous substances	Priority Substances	Quantitative status	Chemical Status
Potential Impacts from Construction of VE											
Cable Route Installation											
Generation of turbid or polluted runoff which could enter the water environment	Scoped In				Scoped out – temporary turbid runoff should not have impact on the physical attributes of the surface water bodies		Scoped In	Scoped In		n/a	n/a
Potential for damage to flood defences or surface water drainage infrastructure	Scoped in				Scoped in		Scoped In	Scoped In		n/a	n/a
Pollution or disruption of flow to groundwater through ground excavations or piling	Scoped in – based on precautionary assumption of shallow connectivity				n/a		n/a	n/a		Scoped out given highly localised and shallow nature of any (as yet unconfirmed) piling.	Scoped out given highly localised and shallow nature of any (as yet unconfirmed) piling.
Onshore Substation Construction											
Generation of turbid or polluted runoff which could enter the water environment	Scoped in				Scoped out – temporary turbid runoff should not have impact on the physical attributes of the surface water bodies		Scoped In	Scoped In		n/a	n/a
Pollution or disruption of flow to groundwater through ground excavation or piling	Scoped in – based on precautionary assumption of shallow connectivity				Scoped in		Scoped In	Scoped In		Scoped out given highly localised and shallow nature of any (as yet unconfirmed) piling.	Scoped out given highly localised and shallow nature of any (as yet unconfirmed) piling.
Water crossings using HDD works											
Generation of turbid or polluted runoff which could enter the water environment	Scoped in				Scoped in given proximity to watercourses		Scoped In	Scoped In		n/a	n/a
Potential for damage to flood defences or surface water drainage infrastructure	Scoped in				Scoped in		Scoped In	Scoped In		n/a	n/a
Pollution or disruption of flow to groundwater through ground excavations	Scoped in – based on precautionary assumption of shallow connectivity				Scoped in		Scoped In	Scoped In		Scoped out given highly localised and shallow nature of any (as yet unconfirmed) piling.	Scoped out given highly localised and shallow nature of any (as yet unconfirmed) piling.
Landfall Installation											

Activity	Biological supporting elements				Hydro-morphological supporting elements		Physico-chemical supporting elements	Chemical		GW	
	Fish	Invertebrates	Macrophytes	Macrophytes and Phytobentos combined	Hydrological Regime	Morphology		Priority hazardous substances	Priority Substances	Quantitative status	Chemical Status
Generation of turbid or polluted runoff which could enter the water environment	Scoped in				Scoped out – should not have any impact on the physical attributes of the surface water bodies		Scoped In	Scoped In		n/a	n/a
Pollution or disruption of flow to groundwater through ground excavations or piling	Scoped in				Scoped in		Scoped In	Scoped In		Scoped out given highly localised and shallow nature of works.	Scoped out given highly localised and shallow nature of works.
Potential Impacts from Operation of VE											
Onshore Substation											
Changes to surface water drainage at the onshore substation location	Scoped in				Scoped in		Scoped In	Scoped In		n/a	n/a
Pollution or disruption from O&M of permanent cable route infrastructure and trenchless crossings	Scoped in				Scoped in		Scoped In	Scoped In		n/a	n/a
Generation of turbid runoff which could enter the water environment	Scoped in				Scoped out – should not have any impact on the physical attributes of the surface water bodies		Scoped In	Scoped In		Scoped out on account of negligible scale of any potential change	n/a
Permanent Cable Route Infrastructure and Trenchless crossings											
Generation of turbid runoff which could enter the water environment	Scoped in				Scoped out – there should be no further physical modification to water courses or the flow regime during the operational phase		Scoped In	Scoped In		n/a	n/a
Decommissioning of VE											
Pollution or disruption from decommissioning of cable route	Scoped in				Scoped out – there should be no further physical modification to water courses or the flow regime during the decommissioning phase		Scoped In	Scoped In		Scoped out on account of negligible scale of any potential change	Scoped out on account of negligible scale of any potential change
Pollution or disruption from decommissioning of onshore substation	Scoped in				Scoped out – there should be no further physical modification to water courses or the flow regime during the decommissioning phase		Scoped In	Scoped In		Scoped out on account of negligible scale of any potential change	Scoped out on account of negligible scale of any potential change

6 DETAILED ASSESSMENT

6.1 DETAILED ASSESSMENT INTRODUCTION

6.1.1 Based on the outcomes of the preliminary scoping assessment (Section 5), this detailed assessment establishes whether the activities associated with VE will:

- Cause a deterioration of a water body from its current status or potential; and/ or
- Prevent future attainment of good status or potential where not already achieved.

6.1.2 This is the stage of the assessment where evidence is provided to demonstrate that the proposed works are compliant. Specifically, it must be shown that the activities scoped into the assessment will not cause deterioration in status nor prevent the achievement of WFD status objectives (at sufficient level of detail to allow consideration of individual supporting elements). Where appropriate it is also the stage where design mitigation, aimed at reducing the effect of an activity, is discussed.

6.1.3 In general, because mitigation measures and construction approaches apply to VE activities across all affected water bodies it is appropriate to discuss approaches holistically, recognising that the assessment is ultimately made on each water body independently.

6.1.4 The mitigation measures that have been identified for VE and which will help to reduce potential for WFD impact are summarised in Table 6.1.

Table 6.1: Summary of mitigation measures to ensure water body status does not deteriorate.

Activity	Biological supporting elements				Hydro-morphological supporting elements		Physico-chemical supporting elements	Chemical		GW	
	Fish	Invertebrates	Macrophytes	Macrophytes and Phytobentos combined	Hydrologic al Regime	Morphology		Priority hazardous substances	Priority Substances	Quantitative status	Chemical Status
Potential Construction Phase Impact Pathways											
Generation of turbid or polluted runoff which could enter the water environment. (see Table 5.1 for associated activities)	> A CoCP is submitted as part of the DCO application. The CoCP includes measures to control environmental impacts at watercourse crossings and crossings beneath flood defences. > The CoCP includes measures to control runoff from the construction works. This could include, for example, sediment fences when working in proximity to open watercourses, containment of storage areas and treatment of any runoff from work areas or water from dewatering of trenches. > All contractors would need to adhere to pollution prevention measures which are considered mandatory by the Project and would be embedded in contracts and via the CoCP. > The CoCP identifies that contractors working within a flood zone 2/3 will require a flood response plan (or similar) to ensure that procedures are in place in the event of a flood warning or the onset of flooding during the construction phase. Through measures such as the ceasing of works, relocation or securing of sensitive equipment and/ or materials and evacuation of workforce personnel, the CoCP will reduce the likelihood of construction activities resulting in incidents detrimental to water quality. > Any refuelling of machinery will be undertaken within designated areas where spillages can be easily contained. > A spill procedure will be documented, and spill kits kept in the vicinity of potentially hazardous materials storage areas. > Disturbance to areas close to watercourses will be reduced to the minimum necessary for the work; this will include buffer zones/minimum set back distances wherever possible. > Deployment of sediment fences along watercourses when working in close proximity, to prevent sediment being washed into watercourses. > Stockpiling of excavated materials during earthworks would be temporary and would only be permitted in designated areas. Designated stockpile areas would be a minimum of 10 m from any open watercourse features. Deployment of sediment fencing is encouraged where stockpiles are upslope of watercourses (and <30m). > Sensitive design of temporary access roads, with deployment of e.g. floating tracks in areas of high soil saturation. > Specific soil management measures, to ensure appropriate separations, stockpiling, and reinstatement measures. > Final HDD (or other trenchless technique) contractor method statements to include break-out plans (including environmental focussed mitigations). > Cable trenches themselves could provide a preferential flow path to surface water and also result in wash out of the backfilling materials which could result in issues in the connected water courses. Measures such as hydraulic brakes will be installed, particularly in steeply sloping areas to ensure this does not occur.						See measures for biological supporting elements which also apply here. Standard CoCP pollution prevention measures including dedicated, bunded storage of hydrocarbons, dedicated refuelling stations (with spill kits), preference for biodegradable lubricants and oils.			n/a	n/a

Activity	Biological supporting elements				Hydro-morphological supporting elements		Physico-chemical supporting elements	Chemical		GW	
	Fish	Invertebrates	Macrophytes	Macrophytes and Phytobentos combined	Hydrologic al Regime	Morphology		Priority hazardous substances	Priority Substances	Quantitative status	Chemical Status
Damage to surface water drainage infrastructure or flood defences (see Table 5.1 for associated activities) Changes to surface water drainage at the onshore substation location (see Table 5.1 for associated activities)	> Design of key crossing points (sea defence structures, main rivers, non-main and ordinary watercourses, roads, utilities etc.), including the use of HDD (or other alternative trenchless crossing techniques), to avoid key areas of sensitivity. Detailed pre-commencement surveys to be carried out to inform works. > The commitment to use trenchless techniques (e.g. HDD) for cable installation will reduce impacts that would occur from using open trenching techniques. > The design of the OnSS may result in the construction of low permeability surfacing, increasing the rate of surface water runoff from the site. A surface water drainage scheme will be required and implemented to ensure the existing runoff rates to the surrounding water environment are maintained at pre-development rates. An outline surface water drainage scheme will be provided as part of the OnSS flood risk assessment. > The detailed (post-consent) design of the surface water drainage scheme would be based on a series of infiltration/soakaway tests carried out on site and the required attenuation volumes will be outlined in the supporting OnSS Flood Risk Assessment (FRA). The tests will be undertaken prior to construction and in accordance with the BRE Digest 365 Guidelines in order to determine the suitability of ground for accepting a drainage discharge. > Where required and practical, drainage would be installed either side of the onshore ECC to ensure existing land drainage flow regimes and routes are maintained. > Any OnSS piling (if required) will be away from main watercourses i.e. should not impede on the short or long-term (potential) lateral movement of watercourse channels. > The ditch that sits in the centre of the Site will however require realignment as part of the OnSS development(s). Although predominantly dry, the ditch serves a function during extreme rainfall. Due to the low ecological value of the ditch (due to its predominately dry conditions), this realignment is not anticipated to have an impact on WFD status. > A recognition of and commitment to micro-siting of cable circuits is intended to provide flexibility to make minor adjustments to the project layouts to accommodate unexpected on-site conditions – which may include surface water drainage conditions.									n/a	n/a
Pollution or disruption of flow to groundwater through ground excavations or piling (see Table 5.1 for associated activities)	> Where required and practical, drainage would be installed either side of the onshore ECC to ensure existing land and groundwater drainage flow regimes are maintained. > Areas at risk of spillage, such as vehicle maintenance areas and hazardous substance stores (including fuel, oils and chemicals) will be bunded and carefully sited to minimise the risk of hazardous substances entering drainage systems or local watercourses. Additionally, the bunded areas will have impermeable bases to limit the potential for migration of contaminants into groundwater following any leakage/spillage. Bunds used to store fuel, oil etc. will have a 110% capacity. > Control around any boreholes on Site should be carefully marked and capped to ensure there is no pathway for pollution to groundwater. > Piling should only take place following ground investigation, with consideration made to minimise disruption of local flow pathways, and avoidance when in close proximity to watercourses (preference to resite e.g. compounds away from watercourses).										
Potential Operational Phase Impact Pathways											
Changes to surface water drainage at the onshore substation and associated with cable routes e.g. introduction/development of preferential flow pathways; Generation of turbid runoff associated with operational phase activities. (see Section 5 for associated	> The design of the OnSS may result in the construction of low permeability surfacing, increasing the rate of surface water runoff from the site. A surface water drainage scheme will be required and implemented to ensure the existing runoff rates to the surrounding water environment are maintained at pre-development rates. An outline surface water drainage scheme is included with the OnSS flood risk assessment (Volume 5, Report 3.2).						Operational practices will incorporate measures to prevent pollution including emergency spill response procedures.			n/a	n/a
Potential Decommissioning Phase Impact Pathways											

Activity	Biological supporting elements				Hydro-morphological supporting elements		Physico-chemical supporting elements	Chemical		GW	
	Fish	Invertebrates	Macrophytes	Macrophytes and Phytobentos combined	Hydrological Regime	Morphology		Priority hazardous substances	Priority Substances	Quantitative status	Chemical Status
Construction type activities associated with e.g. removal of infrastructure	> See construction phase mitigation above. Impact considerations would be similar to those under the construction phase, with the scale of potential impact (likely) reduced compared to the construction phase.										

6.2 WATER BODY DETERIORATION ASSESSMENT

6.2.1 As part of the VE design process, through application of expert consultation, and sensitive and iterative design, a number of designed-in measures (in-built mitigation) have been proposed to reduce the potential impacts for the water environment. As there is a commitment to implementing these measures, they are considered inherently part of the design of VE and have therefore been considered in the assessment presented in this detailed WFD compliance assessment.

6.2.2 These measures are in large part considered standard industry practice for this type of development. The construction measures set out in Table 6.1 are contained within the Volume 9, Report 21: CoCP, thus necessitating their application within contractors' contracts.

6.2.3 The 2022 WFD water body classification is the baseline from which deterioration is deemed not to be permitted and this is the status classification that must not deteriorate when considering the impact of VE on the 'no deterioration of water body status' objective.

6.2.4 Taking into consideration the committed mitigation measures (as set out in Table 6.1 and discussed within Volume 6, Part 3 Chapter 6:Hydrology, Hydrogeology and Flood Risk) the pathways for potential impact are considered (with high confidence) sufficiently removed or reduced to a degree that there will be no deterioration in status irrespective of the baseline WFD status classification (as outlined in Section 4 of this assessment).

6.2.5 No further detailed assessment of individual supporting element deterioration is deemed necessary.

6.3 PROTECTED AREA OBJECTIVES ASSESSMENT

6.3.1 A number of protected areas are found to be associated with those WFD waterbodies scoped into the assessment.

6.3.2 These protected areas have their own monitoring and assessment requirements to determine their condition. They are often assessed for additional pollutants or requirements relevant to their designation. For example, faecal coliform levels are assessed within shellfish and bathing waters.

6.3.3 Therefore, it is important that the standards required for these protected areas are also met. If they are not met, a water body which would otherwise meet the requirements of the WFD, may have the status reduced to 'less than good' as it is not meeting the protected area objectives.

6.3.4 The majority of Protected Areas identified in Section 4.3 are associated with the Essex Gravels Water Body - on account of the large geographic size of the underlying gravels aquifer (1,275 km^2). The potential for generation of impacts to groundwater WFD receptors has been assessed to be extremely limited (very few pathways for impact identified) and the mitigation measures committed within the VE design will ensure no impact to protected areas as a result of groundwater change.

6.3.5 The Protected Areas associated with the surface water bodies within the WFD assessment study area are detailed in Table 4.6 and Table 4.7. The protected areas include Nitrates Directive sites (nutrient sensitivity) in Holland Brook and Tenpenny Brook, as well as SAC, SPA and RAMSAR sites associated with the estuary (downstream connectivity associated with Tenpenny Brook).

6.3.6 Nutrient runoff could be exacerbated by sediment-laden runoff (assuming a particulate nutrient load associated with agricultural soils), however with the mitigation strategies (e.g. soil management strategies and pollution prevention measures) developed during the design of VE (as implemented e.g. in Volume 9, Report 21: CoCP), there will be no compromise of the Nitrates Directive sites.

6.3.7 There are no anticipated impacts on estuarine environmental receptors (associated with the onshore elements of the VE) and thus there are no anticipated impacts on the associated European sites. Note a Habitats Regulations Assessment (HRA) has been undertaken specifically in regard to the offshore VE marine components. This WFD assessment concludes on the basis that the HRA has concluded no Likely Significant Effect.

6.3.8 On this basis, the onshore elements of VE will not result in the protected area objectives for the surface water bodies being impacted and therefore will not cause any deterioration in status or compromise the achievement of the objectives for the relevant WFD water bodies.

6.4 ACHIEVEMENT OF THE WFD OBJECTIVES

6.4.1 During characterisation of surface water bodies, where a status classification of less than good status is determined, the key pressures and associated pathways which resulted in the classification are identified. A programme of measures is then put in place to assist in the achievement of the WFD objectives. The key objective of the WFD was to achieve good ecological status or potential by 2015, however extended timelines can apply where there are justifiable reasons (e.g. due to issues with disproportionate cost, affordability, technical difficulties). In these instances, the objective of the achievement of good status may be the end of the second river basin management cycle in 2021, or the third river basin management cycle in 2027. Where good status is unlikely to be achieved then less stringent objectives can apply to a water body.

6.4.2 Table 6.2 outlines the objectives for each water body associated with VE and the key quality elements driving the status. The Significant Water Management Issues (SWMI), where known, resulting in a status of less than good are summarised and the measures that are recommended in the RBMP to achieve the WFD objectives are identified. Currently none of the associated water bodies are achieving good status/potential and in all cases, as highlighted in Table 6.2, less stringent objectives are necessary as the water bodies are not predicted to achieve good status by the end of the third river basin management cycle, (i.e. 2027). The final column of Table 6.2 assesses the potential impact on the achievement of the WFD objectives and concludes for all surface water bodies that VE will not prevent the achievement of the WFD objectives.

Table 6.2: Significant Water Management Issues (SWMI), Source, Programme of measures, and assessment of the impact of the project on WFD objectives

Water Body	Driving element for status classification	Significant Water Management Issue	Source Activity	Category	Classification element	WFD Objective	Do the onshore activities associated with VE prevent the achievement of the WFD Objectives?
Holland Brook (GB105037077810)	*Biology* – Fish, Invertebrates, Macrophytes *Physico-chemical* – Phosphate *Mitigation Measures Assessment*	Physical modification	Barriers - ecological discontinuity	Other	Fish	Good status prevented by A/HMWB designated use/Action to get biological element to good would have significant adverse impact on use.	There is currently no objective because good status is prevented by the designated use. The VE will not change this objective. (Note the scheme mitigation measures will not adversely affect these classification elements).
		Natural	Saline or other intrusion	No sector responsible	Fish		
		Other pressures	Fish stocking	Other	Fish		
		Diffuse source	Poor soil management	Agriculture and rural land management	Invertebrates		
		Physical modification	Land drainage - structures	Agriculture and rural land management	Invertebrates		
		Other pressures	Saline or other intrusion	Other	Invertebrates		
		Diffuse source	Poor Livestock Management	Agriculture and rural land management	Phosphate	Disproportionately expensive/Disproportionate burdens.	There is currently no objective because it is deemed disproportionately expensive to address the measures. The VE will not change this objective. (Note the scheme mitigation measures will not adversely affect these classification elements).
		Diffuse source	Poor nutrient management	Agriculture and rural land management	Phosphate		
		Diffuse source	Urbanisation - urban development	Urban and transport	Phosphate		
		Point source	Private Sewage Treatment	Urban and transport	Phosphate		
		Physical modification	Other (not in list, must add details in comments)	Local and Central Government	Mitigation Measures Assessment		
Tenpenny Brook (GB105037041310)	*Biology* – Fish, Invertebrates, *Physico-chemical* – Phosphate	Physical modification	Barriers - ecological discontinuity	Local and Central Government	Fish	Disproportionately expensive/Disproportionate burdens.	There is currently no objective because it is deemed disproportionately expensive to address the measures. The VE will not change this objective. (Note the scheme mitigation measures will not adversely affect these classification elements).
		Physical modification	Flood protection - structures	Local and Central Government	Fish		
		Point source	Sewage discharge (continuous)	Water Industry	Phosphate		
Essex Gravels Water Body (GB40503G000400)	*Chemical status element* – General chemical test	Diffuse source	Poor nutrient management	Agriculture and rural land management	General Chemical Test	Disproportionately expensive/Unfavourable balance of costs and benefits.	There is currently no objective because it is deemed disproportionately expensive to address the measures. The VE will not change this objective. (Note the scheme mitigation measures will not adversely affect these classification elements).
		Diffuse source	Poor Livestock Management	Agriculture and rural land management	General Chemical Test		

7 CONCLUSIONS

7.1.1 A WFD assessment has been undertaken for the onshore elements of VE. The assessment is based on guidance developed by the EA and is undertaken in a staged approach to ensure that those components of the project and the associated activities are assessed in the context of the quality elements that contribute to overall WFD status.

7.1.2 The key focus of the assessment was to ensure that VE does not result in a deterioration in the current WFD status based on the 2022 baseline as reported in the Anglian RBMP and also to ensure that the project does not compromise the achievement of the WFD objectives for the improvement in the overall status of the water bodies which could be affected. The assessment also considered the protected areas linked to the surface water bodies in question and confirmed that the protected area objectives are also unaffected.

7.1.3 The screening stage of the WFD compliance assessment concluded that there were a number of components and activities associated with VE that represented a risk to the WFD status and objectives and therefore were scoped into the assessment. The relevant quality elements contributing to the overall status where also considered, and how each activity could affect these.

7.1.4 Based upon the information presented within this WFD compliance assessment, as well as the ES, it is concluded that the construction, maintenance, or decommissioning of VE is not likely to have a permanent (i.e. non-temporary) effect on the status of WFD parameters that are significant at the water body level. Therefore, deterioration to the current status of the water bodies scoped in, is not predicted, nor a prevention of this or other water bodies achieving future WFD status objectives.

8 REFERENCES

Environment Agency (2010) Assessing new modifications for compliance with WFD: Detailed supplementary guidance. NEAS Supplementary Guidance 488_10_SD01. Environment Agency, Bristol.

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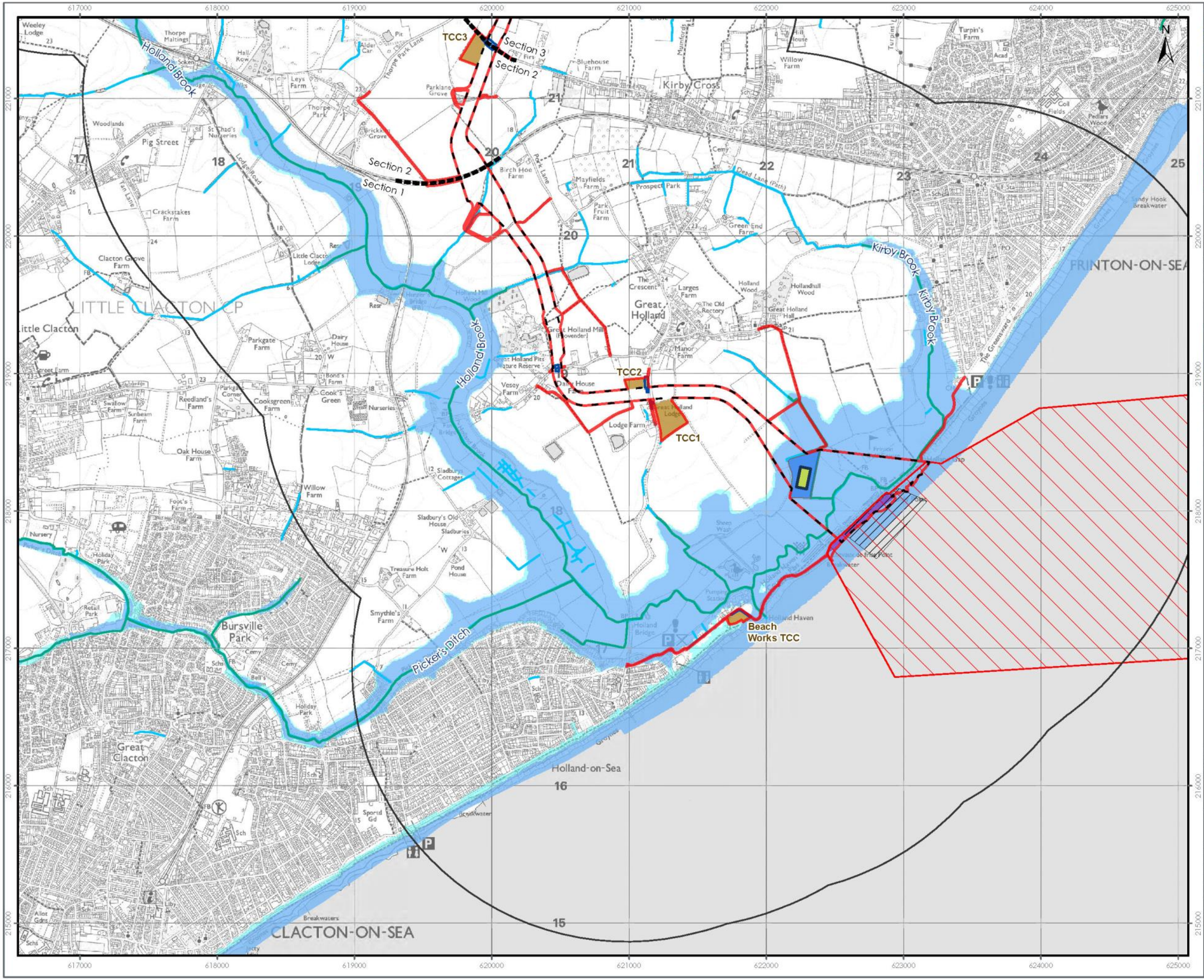
APPENDIX A - FIGURES



LEGEND

- Onshore Order Limits
- Offshore Order Limits
- Onshore Order Limits 2 km Buffer
- Onshore Export Cable Corridor Section Division
- Onshore Export Cable Corridor
- Landfall Exit Pit Sheet Piling Zone
- Landfall Compound Zone
- Indicative Landfall Compound
- Temporary Beach Access Zone
- Temporary Construction Compound
- Access and Crossing Zone
- Statutory Main River
- Minor Watercourse
- Flood Zone 3
- Flood Zone 2

0 0.25 0.5 1
Kilometres

Data Source:
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PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:
SURFACE WATER HYDROLOGY AND FLOOD ZONES (PARTS 1-4)

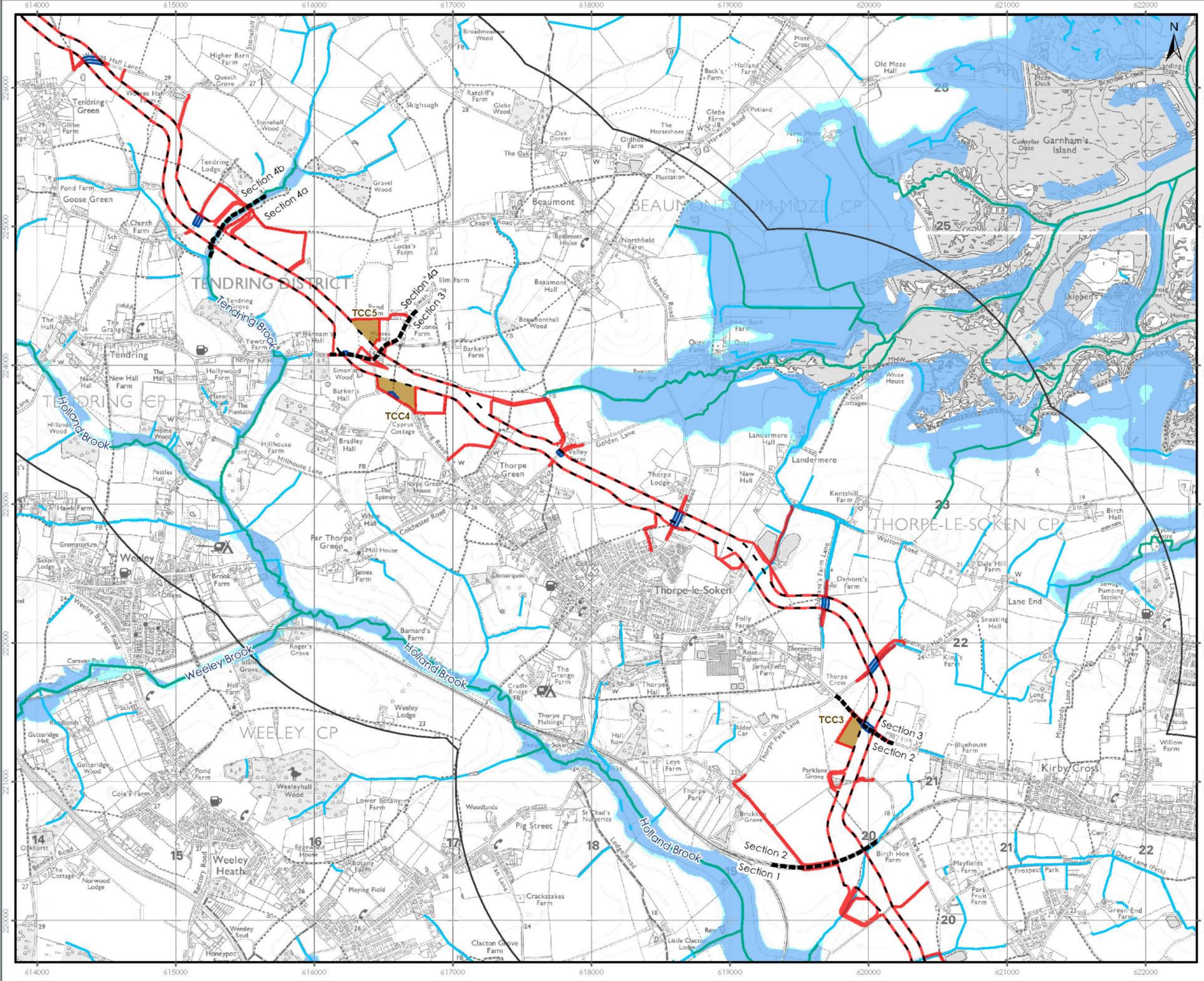
VER	DATE	REMARKS	Drawn	Checked
1	21/02/2024	ES Submission	JO	JRS

DRAWING NUMBER: A.1

Sheet No: 1 of 4

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:25,000	A3	OSGB 1936	British National Grid

FIVE ESTUARIES
OFFSHORE WIND FARM



LEGEND

- Onshore Order Limits
- Onshore Order Limits 2 km Buffer
- Onshore Export Cable Corridor Section Division
- Onshore Export Cable Corridor
- Temporary Construction Compound
- Access and Crossing Zone
- Statutory Main River
- Minor Watercourse
- Flood Zone 3
- Flood Zone 2

0 0.25 0.5 1
Kilometres

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VER	DATE	REMARKS	Drawn	Checked
1	21/02/2024	ES Submission	JO	JRS

DRAWING NUMBER: A.1

Sheet No: 2 of 4

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
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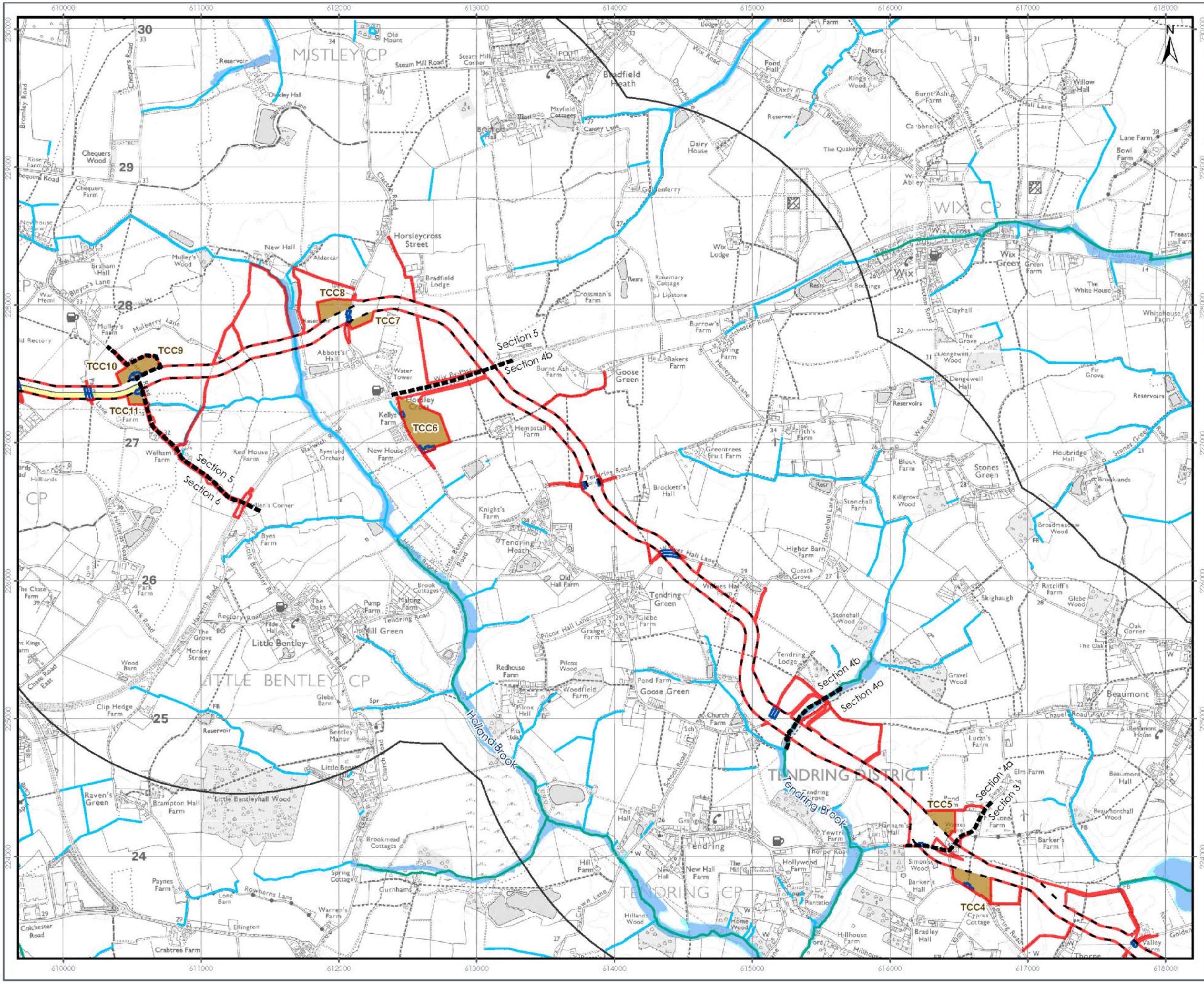
FIVE ESTUARIES
OFFSHORE WIND FARM



LEGEND

- Onshore Order Limits
- Onshore Order Limits 2 km Buffer
- Onshore Export Cable Corridor Section Division
- Onshore Export Cable Corridor
- Substation Temporary Construction Haul Road
- Temporary Construction Compound
- Access and Crossing Zone
- Statutory Main River
- Minor Watercourse
- Flood Zone 3
- Flood Zone 2

0 0.25 0.5 1
Kilometres

PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:

SURFACE WATER HYDROLOGY AND FLOOD ZONES (PARTS 1-4)

VER	DATE	REMARKS	Drawn	Checked
1	21/02/2024	ES Submission	JO	JRS

DRAWING NUMBER: A.1

Sheet No: 3 of 4

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
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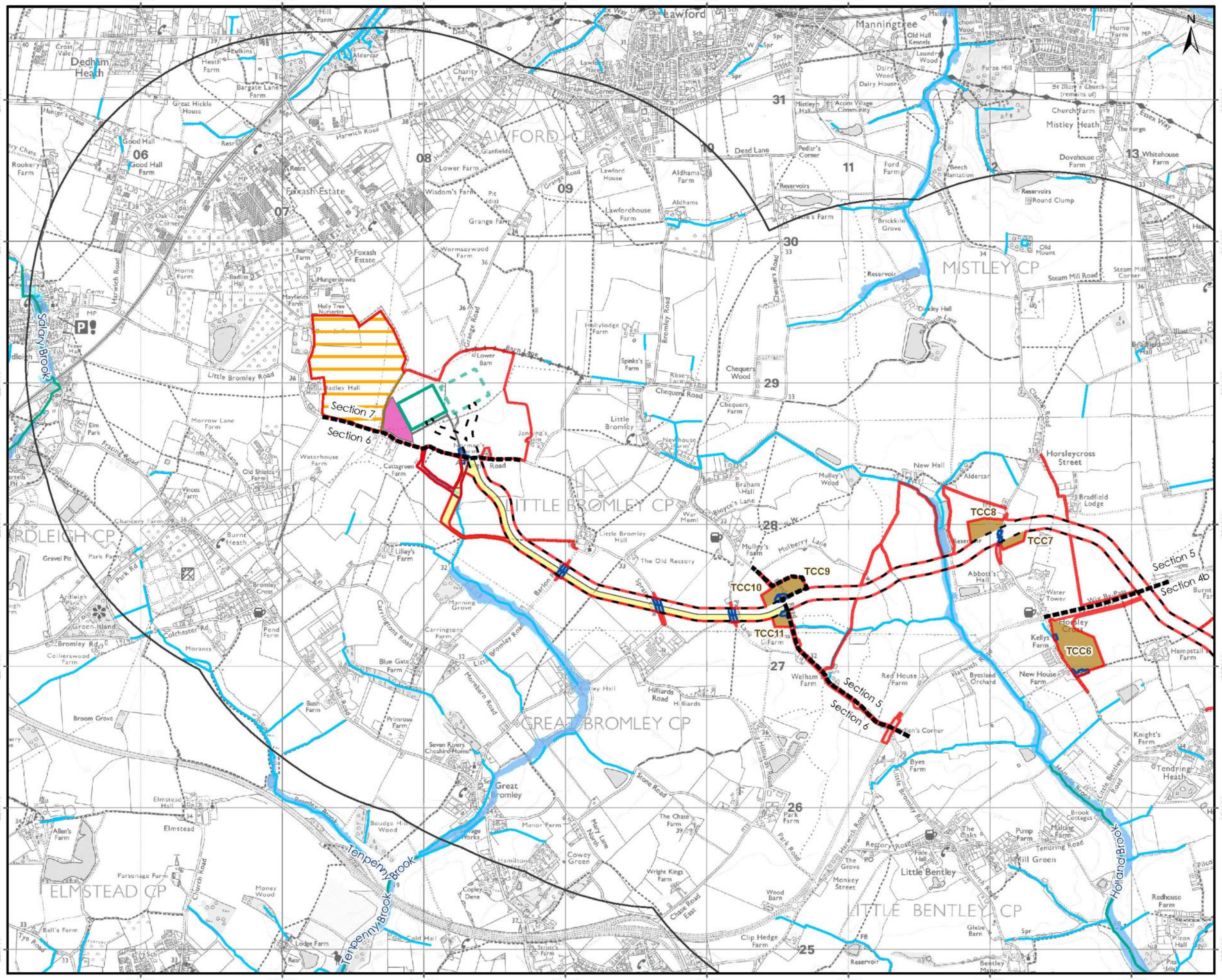
FIVE ESTUARIES
OFFSHORE WIND FARM



LEGEND

- Onshore Order Limits
- Onshore Order Limits 2 km Buffer
- Onshore Export Cable Corridor Section Division
- Onshore Export Cable Corridor
- Substation Operational Boundary
- Substation Temporary Construction Compound
- Ardleigh Road Drainage Zone
- Indicative Substation Access Route
- Substation Temporary Construction Haul Road
- North Falls Indicative Substation Operational Boundary
- North Falls Indicative Substation Access Route
- Temporary Construction Compound
- National Grid EACN Substation Zone
- Access and Crossing Zone
- Statutory Main River
- Minor Watercourse
- Flood Zone 3
- Flood Zone 2

0 0.25 0.5 1
Kilometres

Data Source:

Some features of this map are based on digital spatial data from the Centre for Ecology & Hydrology.

PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:

SURFACE WATER HYDROLOGY AND FLOOD ZONES (PARTS 1-4)

VER	DATE	REMARKS	Drawn	Checked
1	21/02/2024	ES Submission	JO	JRS

DRAWING NUMBER: A.1

Sheet No: 4 of 4

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:25,000	A3	OSGB 1936	British National Grid

FIVE ESTUARIES
OFFSHORE WIND FARM

APPENDIX B – EXTRACT FROM THE WATERCOURSE CROSSINGS REGISTER

SECTION OF CABLE ROUTE	OBSTACLE TYPE	OBSTACLE ID FIVE ESTUARIES CIRCUITS	OBSTACLE DETAILS	OVERHEAD / BURIED / SURFACE	TRENCHED?	TRENCHLESS?	ASSOCIATED HAUL ROAD CROSSINGS
LANDFALL	WATERCOURSE CROSSING	WX-01	ENVIRONMENT AGENCY MAIN RIVER	SURFACE	N	Y	
LANDFALL	WATERCOURSE CROSSING	WX-02A	ENVIRONMENT AGENCY MAIN RIVER	SURFACE	N	Y	
LANDFALL	WATERCOURSE CROSSING	WX-02	ENVIRONMENT AGENCY MAIN RIVER	SURFACE	N	Y	
SECTION 1	WATERCOURSE CROSSING	WX-02B	WATERCOURSE	SURFACE	N	Y	
SECTION 1	WATERCOURSE CROSSING	WX-05	WATERCOURSE/DRAIN	SURFACE	N	Y	
SECTION 1	WATERCOURSE CROSSING	WX-05A	WATERCOURSE	SURFACE	N	Y	
SECTION 1	WATERCOURSE CROSSING	WX-06	WATERCOURSE	SURFACE	N	Y	WX-06A (REMOTE FROM CABLE CORRIDOR))
SECTION 3	WATERCOURSE CROSSING	WX-07	WATERCOURSE / DRAIN	SURFACE	N	Y	
SECTION 3	WATERCOURSE CROSSING	WX-08	WATERCOURSE	SURFACE	P	Y	
SECTION 3	WATERCOURSE CROSSING	WX-09	WATERCOURSE	SURFACE	Y	P	WX-09A
SECTION 3	WATERCOURSE CROSSING	WX-19	WATERCOURSE	SURFACE	N	Y	
SECTION 3	WATERCOURSE CROSSING	WX-20	WATERCOURSE	SURFACE	P	Y	

SECTION OF CABLE ROUTE	OBSTACLE TYPE	OBSTACLE ID FIVE ESTUARIES CIRCUITS	OBSTACLE DETAILS	OVERHEAD / BURIED / SURFACE	TRENCHED?	TRENCHLESS?	ASSOCIATED HAUL ROAD CROSSINGS
	(NF DUCTS)						
SECTION 4A	WATERCOURSE CROSSING	WX-11	WATERCOURSE	SURFACE	N	Y	
SECTION 4A/4B	WATERCOURSE CROSSING	WX-12	ENVIRONMENT AGENCY MAIN RIVER - TENDRING BROOK	SURFACE	N	Y	WX-12A (REMOTE FROM CABLE CORRIDOR)
SECTION 5	WATERCOURSE CROSSING	WX-14	WATERCOURSE	SURFACE	N	Y	
SECTION 5	WATERCOURSE CROSSING	WX-21	WATERCOURSE	SURFACE	P	Y	
SECTION 6/7	WATERCOURSE CROSSING	WX-15	WATERCOURSE	SURFACE	P	Y	
SECTION 6/7	WATERCOURSE CROSSING	WX-22	WATERCOURSE	SURFACE	N	Y	WX-22A

Y: Currently assumed crossing technique

P: Possible crossing technique that may be used

N: No/ Not considered appropriate crossing technique

PHONE 0333 880 5306
EMAIL fiveestuaries@rwe.com
WEBSITE www.fiveestuaries.co.uk
ADDRESS Five Estuaries Offshore Wind Farm Ltd
Windmill Hill Business Park
Whitehill Way, Swindon, SN5 6PB
COMPANY NO Registered in England and Wales
company number 12292474