FIVE ESTUARIES OFFSHORE WIND FARM

ENVIRONMENTAL STATEMENT

VOLUME 9, REPORT 7: OFFSHORE WATER FRAMEWORK DIRECTIVE ASSESSMENT

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DEFINITION OF ACRONYMS

Term	Definition
AEoI	Adverse Effect on Integrity
DCO	Development Consent Order
DO	Dissolved Oxygen
ECC	Export Cable Corridor
E. coli	*Escherichia coli*
EIA	Environmental Impact Assessment
EU	European Union
ES	Environmental Statement
EQSD	Environmental Quality Standards Directive
GWD	Groundwater Directive
HDD	Horizontal Directional Drilling
HRA	Habitats Regulations Assessment
IE	Intestinal Enterococci
IMO	International Maritime Organisation
INNS	Invasive Non-Native Species
JNCC	Joint Nature Conservation Committee
MARPOL	International Convention for the Prevention of Pollution from Ships
MHWS	Mean High Water Springs
MPCP	Marine Pollution Contingency Plan
MW&SQ	Marine Water and Sediment Quality
nm	Nautical Mile
O&M	Operation and Maintenance
OCNS	Offshore Chemical Notification Scheme
OSPAR	Oslo and Paris Conventions
PBDE	Polybrominated Diphenyl Ether
PEIR	Preliminary Environmental Impact Report
PEMP	Project Environment Management Plan
PEMP	Project Environmental Management Plan
PINS	Planning Inspectorate
PLONOR	Pose Little or No Risk to the Environment

Term	Definition
RBMPs	River Basin Management Plans
rBWD	revised Bathing Water Directive
RIAA	Report to Inform Appropriate Assessment
SAC	Special Area of Conservation
SPA	Special Protection Area
SSC	Suspended Sediment Concentration
UV	Ultra Violet
UWWTD	Urban Waste Water Treatment Directive
VE	Five Estuaries Offshore Wind Farm
WFD	Water Framework Directive
WTG	Wind Turbine Generator

GLOSSARY OF TERMS

Term	Definition
Environmental Statement (ES)	The documents that collate the processes and results of the EIA.
Water Framework Directive (WFD)	The Water Framework Directive applies to inland, transitional and coastal surface waters as well as groundwaters. It ensures an integrated approach to water management, respecting the integrity of whole ecosystems, including by regulating individual pollutants and setting corresponding regulatory standards.
Environment Agency	The Environment Agency is a non-departmental public body, established in 1996 and sponsored by the United Kingdom government's Department for Environment, Food and Rural Affairs, with responsibilities relating to the protection and enhancement of the environment in England

1 INTRODUCTION

1.1 PROJECT OVERVIEW

1.1.1 The proposed Five Estuaries Offshore Windfarm (VE) two array areas and Offshore Export Cable Corridor (ECC) are located in the southern North Sea, within the Approaches to the Outer Thames Estuary, on the east coast of England.

1.1.2 This document provides a Water Framework Directive (WFD) compliance assessment in relation to the proposed VE offshore aspects.

1.1.3 VE is a proposed extension to the east of the Galloper Offshore Wind Farm which has been operational since 2018. VE will be located, approximately, 37 km off the east coast of Suffolk. The Offshore ECC extends, approximately westward from the VE array areas to a landfall compound located 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.

1.2 DOCUMENT PURPOSE

1.2.1 The European Union (EU) Water Framework Directive (WFD; 2000/60/EC) came into force in 2000 and establishes a framework for the management and protection of Europe's water resources. It is implemented in England and Wales through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (as amended), modified by the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 on 31 January 2020 following the UK's withdrawal from the EU. The overall objective of the WFD is to achieve good status in all inland, transitional, coastal and ground waters by 2015, unless alternative objectives are set and there are appropriate reasons for time limited derogation (with the UK currently working towards objectives for 2027).

1.2.2 A WFD compliance assessment is conducted during the development process to ensure proposed activities associated with construction, Operation and Maintenance (O&M) and decommissioning are compliant with the WFD objectives and will not result in a deterioration/jeopardy to status of water bodies and protected areas. These desk-based assessments are completed using project-specific information from technical chapters of the Environmental Impact Assessment (EIA) and relevant survey work, while also making use of publicly available data.

1.2.3 This VE WFD compliance assessment has been completed as part of the Environmental Statement (ES) phase and separately considers marine and freshwater water bodies, allowing for in-depth analysis of activities and impacts.

1.2.4 The WFD compliance assessment will consider previous consultation comments received, such as those relating the Marine Water and Sediment Quality (MW&SQ), which have been addressed in full through the assessment. These comments have informed the impact assessment stage of the WFD compliance assessment.

1.3 THE PROCESS

1.3.1 The Environment Agency's "Water Framework Directive assessment: estuarine and coastal waters" (Environment Agency, 2023) process has been used as a template for the WFD compliance assessment, as well as the Planning Inspectorate's Advice Note Eighteen: The Water Framework Directive (Planning Inspectorate, 2017). The WFD compliance assessment has also been conducted in accordance with relevant environmental legislation. Publicly available data has informed the locations of relevant water bodies, Bathing Waters, Shellfish Water Protected Areas, National Site Network and Ramsar sites, and other relevant WFD protected areas.

1.3.2 Data has been collated from (but not limited to) the Environment Agency's Catchment Data Explorer, Bathing Waters profiles, River Basin Management Plans (RBMPs) and interim freshwater classifications, relevant water bodies risk assessment excel files, and WFD protected areas information from Natural England and the Joint Nature Conservation Committee (JNCC).

1.3.3 This information has been used to identify sensitive areas, which are then assessed against environment receptors to determine if there is likely to be an adverse impact from the proposed development.

1.3.4 The WFD compliance assessment comprises of three core stages: Screening, Scoping and Impact Assessment. Screening is conducted to recognise the proposed activities which could potentially have a material impact on the status of WFD water bodies and exclude those activities which are not relevant. Scoping is then conducted to identify the risks associated with development activities, on relevant environmental receptors. The Impact Assessment is a detailed assessment of all relevant environment receptors (those which were previously scoped in). This allows for a statement to be made as to whether to the proposed activities are compliant with the WFD and identify any mitigation measures which may be required in the cases of non-compliance. For an activity to be compliant, it must not lead to a deterioration in water body status or jeopardise relevant water bodies from attaining good status in the future.

1.3.5 The Impact Assessment has been informed by the relevant technical chapters of the ES. This allows for accurate, project-specific information to inform the WFD compliance assessment. Whilst it is recognised that WFD compliance assessments are ideally presented as stand-alone documents, information from technical chapters has been summarised and cross-referenced to avoid significant duplication. Therefore, this document should be read in conjunction with:

- Volume 6, Part 2, Chapter 1: Offshore Project Description;
- Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes;
- Volume 6, Part 2, Chapter 3: Marine Water and Sediment Quality;
- Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology;
- Volume 6, Part 2, Chapter 6: Fish and Shellfish
- Volume 6, Part 5, Annex 2.1: Physical Processes Technical Baseline Report;
- Volume 6, Part 5, Annex 2.3: Physical Processes Technical Assessment;
- Volume 6, Part 5, Annex 5.1: Main Array - Benthic Ecology Monitoring Report;

- Volume 6, Part 5, Annex 5.2: Export Cable Route and Intertidal Benthic Ecology Monitoring Report; and
- Volume 5, Report 4: Report to Inform Appropriate Assessment (RIAA).

1.4 DOCUMENT STRUCTURE

1.4.1 This WFD Compliance Assessment has the following structure:

- Section 1.5 - Provides an overview of the relevant policy and legislative context for the marine WFD assessment;
- Section 3 - Details the proposed approach to consultation and consultation received to date;
- Section 4 - Provides the proposed methodology;
- Section 5 - Reports the findings of the marine WFD Screening exercise;
- Section 6 - Presents the findings of the marine WFD Scoping exercise;
- Section 7 - Presents the detailed impact assessment for the scoped elements; and
- Section 8 - Reports the summary of the assessment.

1.5 POLICY AND LEGISLATION

WATER FRAMEWORK DIRECTIVE

1.5.1 The WFD was established in 2000 in order to provide a single framework for the protection of surface water bodies (including rivers, lakes, coasts (out to 1 nautical mile (nm)) and estuaries) and groundwater. Each surface water body is classified in terms of ecological status, considering biological, hydromorphological, physico-chemical and specific chemical parameters. The different ecological statuses are:

- High;
- Good;
- Moderate;
- Poor; or
- Bad.

1.5.2 The WFD's objective of ‘good chemical status’ is defined in terms of compliance with quality standards established for chemical substances at European level. This will ensure at least a minimum chemical quality, particularly in relation to very toxic substances.

1.5.3 The WFD's objective of 'good ecological status' also requires certain chemical conditions. The chemical requirements include the achievement of environmental quality objectives for discharged priority substances. It also identifies any other substances liable to cause pollution or being discharged in significant quantities.

1.5.4 The Environmental Quality Standards Directive (EQSD) list (Environment Agency, 2016) identifies priority substances and polluting chemicals which should be considered in WFD assessments for transitional and coastal water bodies. The WFD and EQSD seek to reduce these substances entering into the marine environment, primarily from discharges and outfalls. Priority substances include, but are not limited to, benzene, nickel and lead.

1.5.5 The WFD (and Protected Areas including Bathing Waters) and aspects of the Groundwater Directive (2006/118/EC; GWD) were transposed into English and Welsh law by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (hereafter referred to as the WFD Regulations 2017).

1.5.6 Article 4.9 of the WFD notes that compliance with other community environmental legislation must be ensured, with WFD Protected Areas identified under the following Directives (described further below):

- Bathing Water Directive;
- Shellfish Waters Directive;
- Nitrates Directive; and
- Urban Waste Water Treatment Directive.

BATHING WATER DIRECTIVE

1.5.7 The EU's revised Bathing Water Directive (rBWD) came into force in March 2006 for which there are four different classifications of performance:

- Excellent - the highest, cleanest class;
- Good - generally good water quality;
- Sufficient - water quality meets minimum required standards; and
- Poor - water quality does not meet the minimum required standards.

1.5.8 The Environment Agency measures, monitors and reports the number of certain types of bacteria which may indicate the presence of pollution, mainly from sewage or animal faeces. These are *Escherichia coli* (*E. coli*) and Intestinal Enterococci (IE). An increase in the concentrations of these bacteria indicates a decrease in water quality.

1.5.9 The Environment Agency collects at least eight water samples from designated Bathing Water each year during the bathing season (15 May to 30 September). An overall classification for the Bathing Water is then determined by creating a distribution from the monitoring data for the last four years. The 95th and 90th percentile values from each distribution are calculated. A separate distribution is calculated for both *E. coli* and IE. This then enables the determination of the classification for each bacterium for the Bathing Water. Therefore, it is noted that activities from VE have the potential to affect the Bathing Water classifications for up to four bathing seasons after the proposed activities commence.

1.5.10 If the classification for both types of bacteria is different, then the overall compliance of the Bathing Water is the lowest classification achieved by either type. For example, if *E. coli* were performing at 'Good' but IE was performing at 'Sufficient', then the Bathing Water would be classified as performing at 'Sufficient'.

1.5.11 The status of the Bathing Waters within 2 km of the Offshore ECC is presented in Section 1.8 of this document.

SHELLFISH WATERS DIRECTIVE

1.5.12 The Shellfish Waters Directive (2006/113/EC) was repealed in December 2013 and subsumed within the WFD. However, the Shellfish Water Protected Areas (England and Wales) Directions 2016 require the Environment Agency (in England) to observe a microbial standard in all 'Shellfish Water Protected Areas'. The microbial standard is 300 or fewer colony forming units of *E. coli* per 100 ml of shellfish flesh and intervalvular liquid. The Directions also requires the Environment Agency, in England, to assess compliance against this standard to monitor microbial pollution (75% of samples taken within any period of 12 months must be below the microbial standard, and sampling/ analysis must be in accordance with the Directions).

1.5.13 The status of Shellfish Waters within 2 km of the Offshore ECC is presented in Section 1.8 of this document.

NITRATES DIRECTIVE

1.5.14 The Nitrates Directive (91/676/EEC) aims to reduce water pollution from agricultural sources and to prevent such pollution occurring in the future (nitrogen is one of the nutrients that can affect plant growth). Under the Nitrates Directive, surface waters are identified if too much nitrogen has caused a change in plant growth which affects existing plants and animals and the use of the water body.

1.5.15 Details pertaining to Nitrate Vulnerable Zones (NVZ) designated under the Nitrates Directive located within 2 km of the Offshore ECC is presented in Section 1.8 of this document.

URBAN WASTE WATER TREATMENT DIRECTIVE

1.5.16 The Urban Waste Water Treatment Directive (UWWTD) (91/271/EEC) aims to protect the environment from the negative effects of the collection, treatment and discharge of urban waste water. The Directive sets treatment levels on the basis of sizes of sewage discharges and the sensitivity of waters receiving the discharges.

1.5.17 In general, the Directive requires that collected waste water is treated to at least secondary treatment standards for significant discharges. Secondary treatment is a biological treatment process where bacteria are used to break down the biodegradable matter (already much reduced by primary treatment) in waste water. Sensitive areas under the UWWTD are water bodies affected by eutrophication of elevated nitrate concentrations and act as an indication that action is required to prevent further pollution caused by nutrients.

1.5.18 Details pertaining to sensitive areas designated under the UWWTD located within 2 km of the Offshore ECC is presented in Section 1.8 of this document.

HABITATS DIRECTIVES

1.5.19 Directive (92/43/EEC) on the conservation of natural habitats and of wild fauna and flora ("the Habitats Directive") protects habitats and species of European nature conservation importance. Together with the Council Directive (2009/147/EC) on the conservation of wild birds (the 'Birds Directive'), the Habitats Directive establishes a network of internationally important sites, designated for their ecological status. Special Areas of Conservation (SACs) are designated under the Habitats Directive and promote the protection of flora, fauna and habitats. Special Protection Areas (SPAs) are designated under the Birds Directive in order to protect rare, vulnerable and migratory birds. These sites combine to create a Europe-wide 'Natura 2000' network of designated sites.

1.5.20 Sites designated under the Habitats Directive within 2 km of the Offshore ECC are presented in Section 1.8 of this document.

MARINE AND COASTAL ACT (2009)

1.5.21 The Marine and Coastal Act (2009) provides the framework for a marine licensing system. All marine licence applications (above Band 1) must be accompanied by a WFD assessment, to demonstrate that the proposed development 'will not cause deterioration' in WFD water bodies between Mean High Water Springs (MHWS) and one nautical mile seaward.

ENVIRONMENT ACT (2021)

1.5.22 This Act provides powers to enable the Secretary of State (SoS) to amend/modify any legislation for the purpose of making provision about the substances to be taken into account and specifying standards in relation to those substances in assessing the chemical status of surface waters or ground waters. Therefore, the provisions of the Environment Act 2021 could result in amendments/ modifications to the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 which currently transposes the WFD (2000/60/EC) into domestic law.

1.6 CONSULTATION

1.6.1 This WFD assessment pays due regard to all relevant, both formal and informal, consultation responses received during the scoping and Preliminary Environmental Impact Report (PEIR) stages of this EIA. Those consultation responses received to date are provided in Table 1.1.

Table 1.1 Summary of consultation relating to the Water Framework Directive

Consultation Phase	Consultation and Topic Raised	Where the Comment is Addressed
s42 (April, 2023)	The Environment Agency note that a WFD compliance assessment will be undertaken, as part of the application process, for both the marine and terrestrial elements of the proposed development.	This document provides a WFD compliance assessment for both the marine and terrestrial elements of the proposed VE development.

1.7 WATER FRAMEWORK DIRECTIVE ASSESSMENT METHODOLOGY

AVAILABLE GUIDANCE

1.7.1 This WFD compliance assessment document has been principally guided by the Environment Agency (2017) 'Clearing the Waters for All' for assessing the potential deterioration of transitional and coastal water bodies, up to one nautical mile out to sea, as recommended in Advice Note Eighteen: The Water Framework Directive (PINS, 2017). This guidance interprets the 'no deterioration criterion' as applying to each supporting WFD element as well as the overall status classification of the water body. This is supported by the Weser Case[1] which ruled (at a European level) that this was true for all WFD water bodies; for example, a deterioration in the quality of phytoplankton in a transitional water body from Good to Moderate status would be classed as deterioration irrespective of whether this caused the overall water body status to be lowered.

1.7.2 The Cycle 2 RBMP also indicates that within class deterioration of any constituent element is permissible, but should be limited as far as practicable. There are two exceptions to this:

- Where the water body is at the lowest possible class (bad ecological status/potential) where no within class deterioration is allowed; and/or
- Elements that are at High status (with the exception of morphology), which may be allowed to deteriorate to Good status provided a number of additional conditions are met.

1.7.3 From an overall WFD compliance perspective, the principles set out in 'Water Framework Directive assessment: estuarine and coastal waters' (Environment Agency, 2023) are unlikely to change and are used as a basis for assessment of effects in the marine environment.

1.7.4 In addition, the 'Guidance on the Classification of Ecological Potential for Heavily Modified Water Bodies and Artificial Water Bodies' (UKTAG, 2008) has also been considered to provide further information regarding the classification of heavily modified water bodies.

ASSESSMENT PROCESS

1.7.5 This WFD assessment considers the potential for both short-term and long-term impacts on WFD water bodies which have a connection to VE and comprises the following stages:

- Stage 1: Screening;
- Stage 2: Scoping;
- Stage 3: Further assessment; followed by, if required;
- Stage 4: Identification and evaluation of measures; and
- Stage 5: Article 4.7 considerations.

[1] Available at: https://academic.oup.com/jel/article-abstract/28/1/151/1748461 [online]. [Accessed: 18 October 2023].

STAGE 1: SCREENING AND STAGE 2: SCOPING

1.7.6 VE has the potential to affect the water environment and as such requires a Development Consent Order (DCO) which must be supported by environmental information. Moreover, it is not a continuation of a previously permitted activity. Therefore, there is no doubt that a WFD compliance assessment is required to support applications for a DCO, Environmental Permits and potentially other permissions.

1.7.7 The focus of the screening and scoping stages is to identify component activities of VE that have the potential to cause an impact to the WFD quality elements. Given that there are strong links between the screening and scoping parts of the assessment process, they have accordingly been considered together in Section 1.8.

1.7.8 Each water body potentially affected directly or indirectly by VE is considered. Water bodies will be screened out at this stage if it can be robustly demonstrated that there will be no impacts.

1.7.9 The screening stage includes identifying risks from VE's activities to receptors based on the relevant (screened in) water bodies and their water quality elements. In terms of screening new physical works, the Environment Agency position 488_10 guidance (Environment Agency, 2015) provides a protocol for rapid screening of development proposals based upon the type and scale of activities that are being undertaken. A similar process is set out for scoping activities against water quality elements, based on the likelihood of potential risks posed towards WFD objectives.

1.7.10 The scoping process is based on the type and extent of activities, providing a traffic light screening and scoping outcome depending on the level of potential risk against different elements. The Project activities/infrastructure types that are considered unlikely to cause any risk to the delivery of WFD objectives are screened/scoped out (given a green traffic light). Those activities/infrastructure types that are considered likely to carry a significant risk to the delivery of WFD objectives are screened/scoped in for further assessment (given a red traffic light). Those Project activities/infrastructure types that carry a possible risk to the delivery of WFD objectives have been screened/scoped in on precaution for further assessment (given an amber traffic light). Both the screening and scoping stages of the process do not consider the implementation of design principles and environmental measures.

STAGE 3: FURTHER ASSESSMENT

1.7.11 For those activities/infrastructure types that are 'Screened in'/'Scoped in', a further assessment is required in order to provide a proportionate view on:

- The likelihood of a new development causing non-temporary water body-scale deterioration in WFD status; and
- Whether the development may preclude the ability of the water body to achieve its target status.

1.7.12 Those activities/infrastructure types that are eliminated at the screening and scoping stage are not carried forward to the further assessment stage.

1.7.13 The further assessment process involves the examination of sources of potential effect, pathways by which water bodies could be affected, and consideration of effects on each WFD quality element for each WFD water body type, considering embedded environmental measures.

STAGE 4: IDENTIFICATION AND EVALUATION OF MEASURES

1.7.14 For those activities/infrastructure which would cause a risk of non-compliance with the WFD, but which may become compliant with some form of bespoke mitigation (i.e., above and beyond the design principles and environmental measures that are considered during the further assessment stage), the mitigation required is described.

1.7.15 Where mitigation cannot be identified that would result in WFD compliance and no suitable alternatives can be identified, the provisions of Article 4.7 of the WFD would apply (Stage 5: Article 4.7 consideration in paragraphs 3.3.12 to 3.3.15).

STAGE 5: ARTICLE 4.7 CONSIDERATION

1.7.16 Article 4.7 of the WFD allows derogation from the Directive; where its requirements are met, Member States can fail to achieve the objectives or cause a deterioration in status. However, it is only available subject to stringent conditions (set out in Article 4.7 of the WFD).

1.7.17 The provisions of Article 4.7 only apply where:

- failure to meet Good groundwater status, Good Ecological Status or Good Ecological Potential or to prevent deterioration in status arises from new modifications to the physical characteristics of the water body or alteration of groundwater levels; or
- failure to prevent deterioration from High to Good overall status of a surface water body is the result of new sustainable human development activities.

1.7.18 If the further assessment concludes that VE is not compliant with WFD requirements then documentation would be prepared to justify permitting of the development under the provisions of Article 4.7 of the WFD. This would need to demonstrate that the following conditions are met:

- all practicable mitigation has been incorporated;
- there are no significantly better environmental options;
- VE is of overriding public interest and/or the benefits of the Project outweigh the benefits of WFD compliance; and
- the reasons for the modifications to the water body are flagged to the Environment Agency for reporting in the next RBMP.

1.7.19 The assessment, as presented in this document, concludes that VE is compliant with the WFD requirements and therefore derogation is not required in this case (see Section 1.10).

1.8 SCREENING AND SCOPING ASSESSMENT

THE PROPOSED DEVELOPMENT

1.8.1 The VE activities/infrastructure that are relevant to this WFD compliance assessment are presented in Table 1.2. The full suite of details are presented in Volume 6, Part 2, Chapter 1: Offshore Project Description.

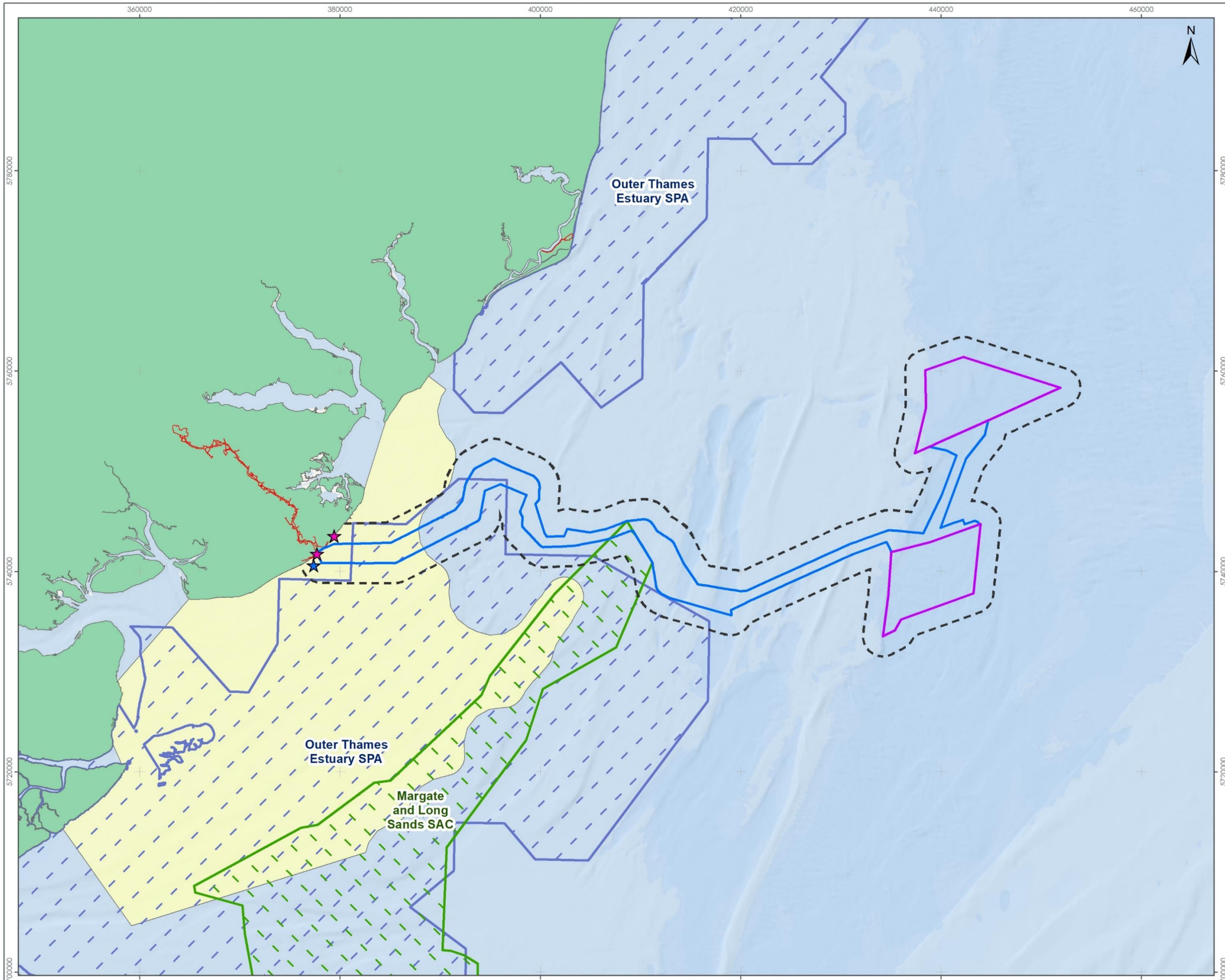
Table 1.2: Maximum Design Scenario and the Water Framework Directive

Location	Activity	Detail
Offshore works	Array area: distance from landfall to array area is 37 km (approximately 20 nautical miles)	The array is sufficiently distanced from the areas protected under the WFD (1 nm for ecological status and 12 nm for chemical status). Therefore activities / infrastructure within the array area are not considered in this assessment; components and activities relevant to this WFD Compliance Assessment are limited to the offshore export cables.
	Offshore ECC: the installation methods for the export cables include: > Jet trenching; > Pre-cut and post-lay ploughing; > Mechanical trenching; > Dredging (Trailer suction hopper dredger, water injection dredger or backhoe dredger); > Mass flow excavation; > Vertical injector; and / or > Rock cutting Sandwave clearance may be used (up to 5.05 km^2) for the installation of the offshore export cables. Offshore ECC: Operation and Maintenance: > An estimated total of 5 km will require remedial work, over the project lifetime; > This could be achieved through jetting or the (re)placement of rock armour (or similar techniques).	The maximum footprint of the installation of offshore export cables within the relevant coastal water body is, approximately, 10 ha (100,008 m^2) based on the assumption of 1,852 m (1 nm) (length) x two cables x 18 m (width of plough) x 1.5 multiplier (as required in the 'Water Framework Directive assessment: estuarine and coastal waters' guidance (Environment Agency, 2023)). There is no intent to purposely release any chemicals listed in the EQSD into the marine environment during construction, operation and maintenance or decommissioning of VE. The Applicant commits to the disposal of sewage and other waste in a manner which complies with all regulatory requirements, including but not limited to the IMO MARPOL (International Maritime Organisation International Convention for the Prevention of Pollution from Ships) requirements.
	Construction vessels:	There is no intent to purposely overboard any chemicals or introduce any invasive

Location	Activity	Detail
	> Up to 35 construction vessels operating on site at any given time; > Up to 4,311 vessel round trips during the entire construction period. Operation and Maintenance vessels: > Up to 27 O&M vessels operating on site at any given time; > Up to 1,776 vessel annual round trips.	species through vessel transit / operations. A Project Environment Management Plan (PEMP) is proposed to be produced to ensure that the potential for contaminant release is strictly controlled. The PEMP will include a Marine Pollution Contingency Plan (MPCP) and will also incorporate plans to cover accidental spills, potential contaminant release. Any disposal of sewage and other waste in a manner which complies with all regulatory requirements, including but not limited to the IMO MARPOL requirements.
Landfall works	Up to three offshore Horizontal Directional Drilling (HDD) entry/exit pits, of which up to three will be open simultaneously, within the intertidal zone or the shallow subtidal. Entry/exit pits will be excavated or dredged to the required depth, and side-cast material for backfilling may be stored adjacent to the entry/exit pit. Entry/exit pits excavated in the intertidal zone will be excavated using a backhoe dredger (or an equivalent) whilst those in the shallow subtidal may use any cable installation methods. A Temporary Construction Compound may be required and a location is identified adjacent to the promenade backing the beach area.	Sheet piled pits consist of metal sheets which may be installed temporally by vibropiling or impact (percussive) piling. For the purposes of the potential impacts from noise and vibrations, percussive piling would result in the greatest impacts. There is no intent to release any chemicals listed in the EQSD into the marine environment during construction, operation and maintenance or decommissioning of VE.

TRANSITIONAL (ESTUARINE) AND COASTAL

1.8.2 As presented in Volume 6, Part 2, Chapter 3: Marine Water and Sediment Quality, one coastal water body has been identified for consideration in this WFD compliance assessment, namely the Essex coastal water body. The Essex coastal water body is 'heavily modified' and currently (based on the 2022 and 2019 (Cycle 3) classification) at moderate overall status, based on moderate ecological potential and failing chemical status. The location of these water bodies, in addition to other WFD designated sites, and VE are shown in Figure 1.1. Summary details for the coastal water bodies are given in Table 1.3.



LEGEND

- Array Areas
- Offshore Export Cable Corridor
- Onshore Order Limits
- Zone of Influence
- Special Area of Conservation
- Special Protection Area
- EA Water Quality Sites
- Designated Bathing Waters

Coastal WFD Waterbodies:

- Essex Coastal Waterbody

0 2.5 5 10
Kilometers

Data Source:
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:

Water Framework Directive Designated Sites

VER	DATE	REMARKS	Drawn	Checked
1	26/01/2024	For Information	BPHB	CH

DRAWING NUMBER: 1.1

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:350,000	A3	WGS84	UTM31N

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OFFSHORE WIND FARM

Table 1.3: Summary of coastal water bodies applicable to VE (EA, 2023a)

Parameter	Essex
Water Body ID	GB650503520001
Water Body Type	Coastal
Surface Area	1,196 km^2
Hydromorphological Designation (Reasons)	Heavily modified (coastal protection; flood protection)
Protected Area Designations	> Special Protection Area; > Ramsar Site; > Special Area of Conservation, > Shellfish Water Directive; > Bathing Water Directive.
Overall Status	Moderate (2022)
Ecological Potential	Moderate (2022)
Chemical Status	Does not require assessment (2022)
Parameters Currently Failing to Achieve Good Status/Potential	> Dissolved Inorganic Nitrogen > Mitigation Measures Assessment
Higher Sensitivity Habitats (total habitat size within water body)	> Intertidal seagrass (47.13 ha); > Mussel beds (1.27 ha); > Polychaete reef (28,246.23 ha); > Saltmarsh (458.66 ha); > Subtidal kelp beds (0.01 ha)
Lower Sensitivity Habitats (total habitat size within water body)	> Cobbles, gravel and shingle (1,153.58 ha); > Intertidal soft sediment (5,649.78 ha); > Rocky shore (1.29 ha); > Subtidal rocky reef (4.10 ha); > Subtidal soft sediments (588,957.42 ha)
Phytoplankton Status	High
History of Harmful Algae	Yes

1.8.3 As required by Environment Agency (2017) guidance, the following WFD protected areas have been considered:

- Bathing Waters;
- Shellfish Water Protected Areas;
- Nutrient Sensitive Waters;
- Special Areas of Conservation (SACs); and
- Special Protection Areas (SPAs).

1.8.4 The WFD protected areas described below are within 2 km of the Offshore ECC / landfall and are therefore included in this assessment:

- Bathing Waters (Table 1.4):
  - Frinton; and
  - Holland.
- SAC (Table 1.5):
  - Margate and Long Sands SAC;
- SPA (Table 1.5):
  - Outer Thames Estuary SPA.

1.8.5 There are no designated Nutrient Sensitive Waters within 2 km of the Offshore ECC / landfall.

Table 1.4: Summary of the designated bathing waters (EA, 2023b)

Bathing Water	Classification			
	2018	2019	2021	2022
Frinton	Good	Good	Good	Excellent
Holland	Excellent	Excellent	Excellent	Excellent
Note, Bathing Waters were not sampled or classified in 2020 due to the COVID-19 pandemic.				

Table 1.5: Summary of the national conservation designations

Site	Qualifying features	Distance from VE
Margate and Long Sands SAC	Annex I habitat: > Sandbanks which are slightly covered by sea water all the time	Direct overlap with the VE Offshore ECC
Outer Thames Estuary SPA	Annex I bird species: > Red-throated diver *Gavia stellata*; > Common tern *Sterna hirundo*; and > Little tern *Sternula albifrons.* The supporting habitats for these species include: > sublittoral coarse sediment; > subtidal sand; > subtidal mud; > subtidal mixed sediment; and > circalittoral rock.	Direct overlap with the VE Offshore ECC

BIOLOGICAL HABITATS

1.8.6 There are five Higher Sensitivity habitats present within the Essex coastal water body, specifically (Table 1.3):

- Polychaete reef;
- Intertidal seagrass;

- Mussel beds;
- Subtidal kelp beds; and
- Saltmarsh.

1.8.7 Analysis of the area using the MAGIC mapping tool (Department for Environment, Food and Rural Affairs (Defra), 2023) indicates that there are no higher sensitivity habitats located within 500 m of the Offshore ECC. As such, no further consideration of this Higher Sensitivity is screened into this WFD compliance assessment.

1.8.8 There are five Lower Sensitivity habitats located within the Essex coastal water body (Table 1.3):

- Cobbles, gravel and shingle;
- Intertidal soft sediments;
- Subtidal rocky reef;
- Rocky shore; and
- Subtidal soft sediments.

1.8.9 Of these, both ‘cobbles, gravel and shingle’ and ‘subtidal soft sediments’ are located within the Offshore ECC. As such, further consideration of these Lower Sensitivity habitats are screened into this WFD compliance assessment. Relevant Lower Sensitivity habitats are presented in Figure 1.2.

375000
380000
385000
390000
5745000
5740000
N

LEGEND

- Offshore Export Cable Corridor
- Onshore Order Limits
- Zone of Influence
- 1nm Buffer from Coast

WFD Habitats: Lower

- Gravel and Cobbles (intertidal & subtidal coarse sediment A2.1, A5.1)
- Subtidal Soft Sediment (Sand, Mud & Mixed A5.2, A5.3, A5.4)

0 0.5 1 2
Kilometers

Data Source:

PROJECT TITLE:

FIVE ESTUARIES OFFSHORE WINDFARM

DRAWING TITLE:

Benthic Habitats of Relevance to the Water Framework Directive

VER	DATE	REMARKS	Drawn	Checked
1	26/01/2024	For Information	BPHB	CH

DRAWING NUMBER: 1.2

SCALE:	PLOT SIZE:	DATUM:	PROJECTION:
1:60,000	A3	WGS84	UTM31N

FIVE ESTUARIES
OFFSHORE WIND FARM

SCOPING CONSIDERATIONS

1.8.10 The Project does not intend to release substances on the EQSD list. As such, there is no defined mixing zone for these chemicals. The detailed scoping considerations for the screened in marine activities are presented in Table 1.6 while Table 1.7 provides a summary of the results of the marine water body scoping for consideration in the detailed impact assessment.

Table 1.6 : Scoping of activities associated with the offshore activities / infrastructure

Activity	Phase and Associated Activities	Explanation	Scoped In?
Hydromorphology			
Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at High status?	All phases – no activities identified.	The proposed activities associated with the offshore infrastructure of the Proposed Development will not affect a water body at High status for hydromorphology.	No
Could significantly impact the hydromorphology of any water body?	Construction – no activities have been identified which could impact the hydromorphology of the water bodies. Operation and maintenance – the presence of cables and cable protection. Decommissioning – no activities have been identified which could impact the hydromorphology of the water bodies.	There will be no physical barrier placed within the Essex coastal water body. The presence of the offshore export cables buried in the seabed will not affect current speeds and will, as a worst-case, result in a minor depth reduction at cable crossings and where cable protection is used. Therefore, changes to water depth and currents are not considered to be significant. As presented in Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes, the installation of cable protection could result in a locally raised obstacle up to 1.1m with a sloped side profile. Cable protection will be placed onto the seabed surface above the cable and could therefore directly trap or block sediment in transport, locally impacting down-drift locations. The assessment concluded that the presence of cable protection measures would not continuously	No

		affect patterns of sediment transport following the initial period of accumulation. As such any changes on seabed morphology away from the cable protection will also be very small. Of note is that the extent of the cable protection measures does not constitute a continuous blockage along the cable route corridor. This is further supported by the assessment of the potential changes in the wave and tidal regime presented in Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes. This assessment concluded that the changes in the wave regime, from the array structures, at the coastlines are predicted to be not measurable in practice and will be indistinguishable from normal short-term natural variability in wave height (both for individual wave heights and in terms of the overall sea state). Accordingly, these changes are not predicted to have any measurable influence on littoral sediment transport.	
Is in a water body that is heavily modified for the same use as the activity?	All phases – no activities identified.	The Essex coastal water body is classified as heavily modified for coastal and flood protection. It is not modified for the purpose of renewable energy, and activities associated with the VE development are not anticipated to influence activities related to the heavily modified hydromorphological designation of the Essex coastal water body. Therefore, no further consideration of the potential impacts associated with VE is required.	No

Biology			
Is the footprint of the activity 0.5 km^2 or larger?	Construction – installation of offshore export cables. Operation and Maintenance – maintenance, reburial and repair of offshore export cables. Decommissioning – it is expected that the export cables will be left *in situ* and in accordance with current UK Government approved practice. Therefore, no activities have been identified.	The footprint of construction works within the Essex coastal water body, including a factor of 1.5 times the footprint in terms of dredging is, approximately, 10 km^2 and is therefore above the 0.5 km^2 threshold. The cable lengths to be replaced or reburied during the operation and maintenance phase will be shorter, and the potential impacts will be more localised and occur over a shorter duration than those considered during the construction phase.	Yes
Is the footprint of the activity 1% or more of the water body's total area?	Construction –installation of offshore export cables. Operation and maintenance – maintenance, reburial and repair of export cables. Decommissioning – it is expected that the export cables will be left *in situ* and in accordance with current UK Government approved practice. Therefore, no activities have been identified.	The footprint of the works, including a factor of 1.5 times the footprint of the dredged area, totals approximately 0.02% of the Essex coastal water body area and therefore is less than the 1% threshold. The cable lengths to be replaced or reburied during the operation and maintenance phase will be shorter, and the potential impacts will be more localised and occur over a shorter duration than those considered during the construction phase.	No
Is the footprint of the activity within 500m of any Higher Sensitivity habitat?	Construction –installation of offshore export cables. Operation and maintenance – maintenance, reburial and repair of export cables.	The Offshore ECC is not within 500 m of a Higher Sensitivity Habitat in the Essex coastal water body.	No

	Decommissioning – it is expected that the export cables will be left *in situ* and in accordance with current UK Government approved practice. Therefore, no activities have been identified.		
Is the footprint of the activity 1% or more of any Lower Sensitivity habitat?	Construction –installation of offshore export cables. Operation and maintenance – maintenance, reburial and repair of export cables. Decommissioning – it is expected that the export cables will be left *in situ* and in accordance with current UK Government approved practice. Therefore, no activities have been identified.	The footprint of the Offshore ECC is: > 6% for Cobbles, gravel and shingle; and > 0.22% for Subtidal soft sediments. As such, it exceeds the 1% threshold for: > Cobbles, gravel and shingle.	Yes – cobbles, gravel and shingle.
Fish			
Is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary?	All phases – no activities identified.	The activities associated with the offshore export cables will not take place within an estuary and it is highly unlikely to prevent fish entering or affect fish migrating through an estuary. For each of the migratory fish species known to be present, Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology, no significant impacts on these fish populations were identified as a result of the construction, O&M and decommissioning of VE.	No

Could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)?	Construction – Wind Turbine Generator (WTG) installation within the array. No other activities have been identified. Operation and maintenance –presence of offshore export cables. Decommissioning – no activities have been identified.	The proposed activities for the Proposed Development will not cause a physical barrier which prevents fish from entering estuaries or to migration patterns. The presence of the offshore export cable buried in the seabed will not affect current speeds and will, as a worst-case result in a minor reduction in terms of total water depth at cable crossings. Therefore, changes to water depth and changes in currents (both tidal and non-tidal) are not considered to be significant and are not considered to impact on normal fish behaviour, such as, movement, migration or spawning. Volume 6, Part 2, Chapter 6: Fish and Shellfish Ecology presents full details of the noise modelling undertaken to determine the potential impacts of noise and vibration on fish receptors as a result of the proposed activities associated with VE's offshore elements. No significant effects were predicted on fish species. There will not be any outfalls or discharges associated with VE and as such the proposed activities are not expected to cause a reduction in the dissolved oxygen in the water column. There is therefore no potential for chemical changes and its subsequent implications upon fish species.	No
Could cause entrainment or impingement of fish?	All phases – no activities identified.	No fish entrainment or impingement will occur as a result of VE.	No

Water Quality			
Could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)?	Construction –installation of offshore export cables and undertaking the trenchless crossing (e.g. HDD) at the landfall. Operation and maintenance – maintenance, reburial and repair of export cables. Decommissioning – it is expected that the export cables will be left *in situ* and in accordance with current UK Government approved practice. Therefore, no activities have been identified.	Temperature or salinity is not expected to be affected as a result of export cable installation activities and consequently these parameters have not been taken forward to the impact assessment. Sediment re-suspension into the water column will result in temporary increases in suspended sediment concentrations (SSC) as a result of construction activities such as seabed preparation and cable installation. The methods used for installation will affect the amount of sediment displaced, but it is considered that the impacts will be localised, and high levels of SSC will not disperse to a significant level outside the footprint of the activity. During these periods of increased SSC, there will be a reduction in water clarity (i.e., an increase in turbidity) which could result in the greater longevity of microbes in the water column. No additional nutrients will be introduced into the marine environment as a result of the proposed offshore activities. Whilst sediment-bound nutrients may be released as a result of the proposed offshore activities, the concentrations are not anticipated to be significant. These releases are considered to be analogous to storm events and therefore no deterioration from the existing baseline with respect to nutrients is anticipated.	Yes – water clarity

Is in a water body with a phytoplankton status of Moderate, Poor or Bad?	All phases – installation, operation and maintenance.	The Essex coastal water body is currently classified as being High phytoplankton status. Therefore, this has not been taken forward for assessment.	No
Is in a water body with a history of harmful algae?	All phases – installation, operation and maintenance.	The Essex coastal water body is known to have a history of harmful algae.	Yes
Does the activity use or release chemicals which are on the Environmental Quality Standards Directive (EQSD) list?	Construction – trenchless techniques at the landfall. Operation and maintenance, decommissioning – no activities identified.	The proposed activities do not include the use of direct discharge of any chemicals listed under the EQSD list. The only substance which may be released into the environment is bentonite from the trenchless crossing (e.g. HDD) at the landfall during export cable installation. Bentonite is a non-toxic, inert, natural clay mineral (<63µm particle diameter) and is not on the EQSD list. It is included in the List of Notified Chemicals approved for use and discharge into the marine environment and is classified as a group E substance under the Offshore Chemical Notification Scheme (OCNS) (Cefas, 2023). Substances in group E are defined as the group least likely to cause environmental harm and are “readily biodegradable and is non-bioaccumulative”. This is further supported by bentonite being included on the Oslo-Paris (OSPAR) Convention for the Protection of the Marine Environment of the North-East Atlantic List of Substances Used and Discharged Offshore which Are Considered to Pose Little or No Risk to the Environment (PLONOR) (OSPAR, 2019). Therefore, no deterioration of the status of any sites designated under the WFD is anticipated from bentonite release.	No

Does the activity disturb sediments with contaminants above Cefas Action Level 1?	Construction –installation of offshore export cables. Operation and maintenance – maintenance, reburial and repair of export cables. Decommissioning – it is expected that the export cables will be left *in situ* and in accordance with current UK Government approved practice. Therefore, no activities have been identified.	Recorded sediment contaminant concentrations indicate minor exceedances in samples above Cefas Action Level 1 (Volume 6, Part 2, Chapter 3: Marine Water and Sediment Quality). These exceedances are all within the offshore section of the ECC and array area, with no exceedances within the intertidal. Therefore, whilst project activities could disturb sediments containing contaminants above Action Level 1, no contaminated sediments have been recorded within the WFD study area.	No
Invasive Non-Native Species (INNS)			
Could the activities introduce or spread INNS?	Construction / decommissioning –use of construction / decommissioning vessels. Operation and maintenance –presence of infrastructure on the seabed and operation and maintenance vessels.	Any man-made structures placed on the seabed has the potential to be colonised by a range of marine species. These structures have the potential to act as artificial reefs and may also facilitate the spread of non-native species if these species are already present (i.e., they will not act as a vector for INNS in and of themselves). The vast majority of these structures will be located within the array area and so are not relevant to this WFD assessment; however, cable protection may be installed within the Essex coastal water body. If required, it is likely to be limited to small areas of the offshore cable corridor. Project vessels have the potential to introduce or spread INNS through the discharge of ballast water within the water bodies. This potential impact will be mitigated through designed-in environmental	Yes

		measures such as the marine biosecurity plan as part of the Project Environmental Management Plan (PEMP). Vessels will also comply with IMO ballast water management guidelines, minimising risks associated with INNS. In addition, the materials and vessels are highly likely to be from within European and / or UK waters. There is currently little evidence from other offshore wind farms to suggest adverse effects on key species and habitats from INNS.	

Table 1.7: Summary of scoping of activities associated with the offshore activities / infrastructure

Receptor	Potential Risk to Receptor	Risk Issue(s) for Impact Assessment
Essex coastal water body		
Hydromorphology	No	Not applicable.
Biology - habitats	Yes	Offshore cable installation, repair and maintenance may result in direct and indirect effects upon the features identified.
Biology - fish	No	Not applicable.
Water quality	Yes	Offshore cable installation, repair and maintenance may affect water clarity and microbiology. There is a history of harmful algae within this water body.
Invasive Non-Native Species	Yes	Cable protection.

MARINE PROTECTED AREAS

1.8.11 As required by Environment Agency (2017) guidance, the following WFD protected areas have been considered:

- Bathing Waters;
- Shellfish Water Protected Areas;
- Nutrient Sensitive Waters;
- Special Areas of Conservation (SACs); and
- Special Protection Areas (SPAs).

1.8.12 The following sites described below are within 2 km of the Offshore ECC / landfall and are therefore included in this assessment:

- Bathing Waters (Table 1.4):
  - Frinton; and
  - Holland.
- SAC (Table 1.5):
  - Margate and Long Sands SAC;
- SPA (Table 1.5):
  - Outer Thames Estuary SPA.

1.8.13 There are no designated Shellfish Water Protected Areas, Nutrient Sensitive Waters or UUTWD within 2 km of the Offshore ECC / landfall.

1.8.14 In summary, the following protected areas, within 2 km of the Offshore ECC, have been scoped in for further consideration within the detailed impact assessment:

- Frinton Bathing Water;
- Holland Bathing Water;
- Margate and Long Sands SAC; and
- Outer Thames Estuary SPA.

1.9 FURTHER ASSESSMENT

1.9.1 This section presents the results of the further assessment on those marine elements scoped in (Table 1.7) which may be impacted by the proposed activities associated with the offshore infrastructure. In addition, a consideration of both the WFD requirement for ‘no deterioration’ in status and the need to ensure the Proposed Development does not prevent the achievement of future objectives.

1.9.2 The screening and scoping of activities / infrastructure types that was undertaken in Section 1.8 does not include a consideration of VE's environmental mitigation measures. However, in practice these mitigation measures will be incorporated in order to manage any potential effects upon the water environment to an acceptable level. A description of the relevant offshore mitigation measures is provided in Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology. A complete set of project mitigation measures is provided in Volume 9, Report 31: Schedule of Mitigation Route Map.

BIOLOGICAL HABITATS

1.9.3 The VE ECC transects the Essex coastal water body (Figure 1.1). As presented in Table 1.3, there are five Higher Sensitivity habitats present within this water body (Intertidal seagrass; Mussel beds; Polychaete reef; Saltmarsh; and Subtidal kelp beds), of which none are located within 500 m of the Offshore ECC.

1.9.4 Of the five Lower Sensitivity habitats present within the Essex coastal water body, the proposed Offshore ECC crosses both 'Cobbles, gravel and shingle' and 'Subtidal soft sediments' for which the former qualifies for inclusion in this WFD compliance assessment due to the area impacted by the proposed works (Environment Agency, 2023).

1.9.5 Works associated with export cable installation within the Essex coastal water body includes seabed preparation, cable installation into the seabed (trenching) and the HDD at the landfall. O&M activities may also occur and allow for eight inter-array cable repairs and up to nine export cable repairs during the project lifetime. Further details are provided in Volume 6, Part 2, Chapter 1: Offshore Project Description.

1.9.6 The activities associated with export cable installation has the potential to result in the temporary habitat loss / disturbance of up to 10 km^2 within the Essex coastal water body during the construction phase. This is equivalent to 0.02% of the total area of this water body. With respect to the O&M phase, it is predicted that there will be up to 5 km of export cable repairs (including both within and outside the Essex coastal water body) over the project lifetime, which is less than 0.02% of the total area of this water body.

1.9.7 A characterisation of the benthic and subtidal habitats which may be directly or indirectly impacted by VE is provided in Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology. With respect to installation activities, given the limited spatial and temporal extent of the works, it has been concluded that both faunal and floral population re-colonisation and recovery will occur from recovering and / or un-impacted communities in adjacent habitats.

1.9.8 The EIA assessment concluded that there would be no adverse significant effects on benthic receptors from the habitat disturbance from the proposed activities associated with the proposed development.

1.9.9 The subtidal benthic habitats identified within the VE Order Limits and wider region and thus including the Essex coastal water body has been demonstrated to be both common and widespread to the southern North Sea (Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology). The intertidal benthic habitats identified within the VE Order Limits, including the Essex coastal water body have been characterised by low richness and diversity, with one station being abiotic, likely associated with the exposure of the survey area and the coarseness of the sediment. Thus, only taxa that are capable of withstanding the environmental stresses of long exposure are capable of living in such environment (Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology). This therefore infers an adaption to SSC, turbidity and deposition events of a level comparable to those which may be experienced during cable installation / O&M activities.

1.9.10 The sensitivity of all biotopes that are known to characterise the study area and that have been assessed within the EIA (Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology) have been assessed according to the detailed MarESA sensitivity assessments (Table 5.4 of Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology). This assessment determined that all biotopes have a low to medium / moderate sensitivity to a disturbance likely to result from the VE installation / decommissioning and O&M activities. None of the biotopes are considered geographically restricted and as detailed within the baseline characterisation, comparable habitats are distributed within the wider region and southern North Sea. Therefore, given the relatively small spatial scales for the total temporary habitat disturbance outlined above, this loss is not expected to undermine regional ecosystem functions or diminish biodiversity.

1.9.11 The impact upon benthic habitats is predicted to be of local spatial extent (i.e. restricted to discrete areas within VE), short temporal duration (limited to the period of construction and O&M activities), intermittent and with high reversibility.

1.9.12 The proposed development is therefore considered to be compliant with the WFD requirements and would not result in a deterioration of the current status of the Essex coastal water body, in terms of Biological Habitats.

WATER QUALITY

1.9.13 The offshore ECC transects the Essex coastal water body and, therefore, there is a requirement to consider the potential for deterioration of water quality within this waterbody. This deterioration could be characterised by an increase in suspended sediments, nutrients, oxygen or bacterial concentrations, and potential to detrimentally impact the current moderate phytoplankton status of the water body.

1.9.14 As well as the above-mentioned water body, consideration for reduction in water quality is also afforded to the relevant Bathing Waters (Figure 1.1; further details, including classification details, for these Bathing Waters are provided in Table 1.4):

- Frinton; and
- Holland.

1.9.15 Those VE activities which introduce the potential for a reduction in water quality are typically those which involve seabed disturbance and / or an increase in SSC. Seabed disturbance may also result in the release of sediment bound contaminants into the water column. Examples of such activities include drilling works and export cable installation, including associated landfall works.

1.9.16 An increase in suspended sediments may consequently result in an increase in bacterial counts within the water column. Bacterial mortality, including of *E.coli* and IE, is strongly influenced by the amount of Ultra Violet (UV) light penetrating the water column. Under higher UV scenarios the bacterium mortality is higher therefore bacterium persist longer in the marine environment when light levels in the water column are reduced (i.e. during periods of high SSC).

1.9.17 Dissolved oxygen (DO) levels can also decrease as a reaction to nutrient inputs. When nutrient loading is too high, phytoplankton can bloom and then die. Bacteria and other decomposer organisms then use oxygen to break down the available organic matter. However, no nutrients are anticipated to be released in significant concentrations from the seabed as a result of VE activities, beyond typical storm conditions. The project has no outfalls or discharges and as such the proposed activities are not expected to cause a reduction in the dissolved oxygen within the water column.

1.9.18 Accidental events may also result in water quality deterioration, for example through the unplanned release of chemicals and / or materials during planned VE activities. This risk is mitigated and managed through following the available best practice guidance.

1.9.19 A full assessment of the potential impacts of the proposed project and its activities upon water quality is presented within Volume 6, Part 2, Chapter 3: Marine Water and Sediment Quality, with detail also provided within Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes. Both assessments conclude that effects that there would be no adverse significant effects upon marine water and sediment quality from the proposed activities associated with the proposed development.

1.9.20 As stated in Table 1.3, the Essex coastal water body is currently classified as having a history of harmful algae. The introduction of nutrients, such as inorganic nitrogen, can result in algae (e.g., cyanobacteria) blooms which are capable of producing extremely toxic compounds and can have harmful effects on the marine fauna, and potentially humans. Whilst sediment mobilisation (suspension) is an inherent consequence of VE construction and O&M activities, it is considered unlikely that this will lead to a significant nutrient uplift in the surrounding waters. The majority of the proposed VE activities will take place in open water, where dispersion is high and thus effects will be temporary. Furthermore, there is no planned activities involving the release of nutrients. Therefore, it is considered unlikely that activities associated with VE will result in algae blooms within the Essex coastal water body.

1.9.21 There is not predicted to be a deterioration in the water quality of either the Essex water body, nor the two Bathing Waters previously identified. Neither is there likelihood that VE will contribute to harmful algae levels. The proposed development is therefore considered to be compliant with the WFD requirements and would not result in a deterioration of the current status of these features.

MARINE INVASIVE NON-NATIVE SPECIES

1.9.22 There is potential for the introduction and spread of marine INNS through the presence of subsea infrastructure and vessel movement in relation to the project activities. The installation of man-made structures within the Essex coastal water body provides an opportunity for colonisation by a range of marine species, some of which may not already be present within the ecosystem.

1.9.23 Vessel movement throughout the Essex coastal water body also provides a potential vector for the introduction of marine INNS. For the purposes of the EIA, there is anticipated to be a total of 4,311 and 1,220 vessel round trips during the installation / decommissioning and O&M project phases, respectively. VE will adopt and follow available best practice guidance during all stages in development (construction, O&M and decommissioning) to minimise the introduction or spread of marine INNS, through the implementation of a Biosecurity Plan.

1.9.24 A characterisation of the benthic ecology and biodiversity which may be directly or indirectly impacted by VE is provided in Volume 6, Part 2, Chapter 5: Benthic and Intertidal Ecology. The EIA assessment concluded that there would be no adverse significant effects on benthic receptors from the proposed activities associated with the proposed development, with respect to marine INNS.

1.9.25 Overall, there is not predicted to be a deterioration in status of the Essex coastal water body in relation to marine INNS. The proposed development is therefore considered to be compliant with the WFD and thus would not result in a deterioration of the current status of the Essex coastal water body, nor prevent the water body for achieving future objectives under the WFD.

PROTECTED AREAS

1.9.26 Those sites designated as protected areas under the WFD and therefore could be impacted by project activities include:

- Holland Bathing Water;
- Frinton Bathing Water;
- Margate and Long Sands SAC; and
- Outer Thames Estuary SPA.

1.9.27 Sediment resuspension resulting from the proposed project activities may mobilise bacteria within the sediments into the water column, affecting the performance of the above-mentioned Bathing Waters. During periods of increased turbidity, a reduction in the amount of UV light within the water column could occur and reduce the mortality rate of bacteria within the water column.

1.9.28 Sediment plumes are expected to quickly dissipate after cessation of the activities, due to the processes of settling and dispersion (as assessed in Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes). Concentrations would be expected to rapidly reduce, returning to background levels. Sediment deposition will consist primarily of the coarser sediments deposited in the vicinity of the source of suspension, with fine material likely being more widely distributed. This widely dispersed particulate matter will form part of the background concentration of SPM in the nearshore, therefore is unlikely to settle in measurable thickness. The impacts from increased SSCs and deposition from construction activities is expected to be short-term, intermittent and of localised extent.

1.9.29 The consistent 'Excellent' performance of the Holland and Frinton Bathing Waters, (see Table 1.4) indicates that the sediment bacterium levels, in close proximity to these Bathing Waters, do not result in a reduction in water quality during natural elevated suspension events. This therefore suggests that elevated bacterial concentrations are unlikely to result from the disturbance of seabed sediments in the vicinity of these Bathing Waters. Furthermore, given the short-term nature of the sediment plumes (as assessed in Volume 6, Part 2, Chapter 2: Marine Geology, Oceanography and Physical Processes), the relative increases in bacteria are considered to be negligible in terms of Bathing Waters compliance. No deterioration or non-compliances at the two Bathing Waters are anticipated to occur as a result of the proposed activities.

1.9.30 The identified nature conservation designated sites identified have been subjected to the Habitats Regulations Assessment (HRA) process (Volume 5, Report 4: Report to Inform Appropriate Assessment).

1.9.31 Overall, there is not predicted to be a deterioration in status of the Essex coastal water body in relation to the WFD protected areas. VE is therefore considered to be compliant with the WFD and thus would not result in a deterioration of the current status of the Essex coastal water body, nor prevent the water body for achieving future objectives under the WFD.

1.10 SUMMARY: MARINE WFD ASSESSMENT

1.10.1 This document has been prepared to present the findings of the marine WFD Assessment for the potential impacts of VE. The purpose of this WFD assessment is to ensure that the proposed activities associated with VE do not:

- result in a deterioration in a designated water body (or protected area); and
- jeopardise the attainment of good status (or the potential to achieve good ecological and chemical status).

1.10.2 The conclusions of this assessment are presented in Table 1.8. This assessment has been informed and presents a summary of the information presented in the EIA and RIAA presented within this ES. Further information is provided in the relation chapters and annexes of the ES.

Table 1.8: Marine WFD assessment conclusions

Water Body / Protected Area	Receptor	Conclusion
Essex (coastal)	Biology - habitats	No deterioration in the status of the water body element; the proposed activities will not jeopardise the attainment of good status.
	Water quality	No deterioration in the status of the water body element; the proposed activities will not jeopardise the attainment of good status.
	Invasive Non-Native Species	No deterioration in the status of the water body element; the proposed activities will not jeopardise the attainment of good status.
National Network Sites: > Margate and Long Sands SAC; and > Outer Thames Estuary SPA.		No Adverse Effect on Integrity (AEoI) is predicted from the proposed activities.
Bathing Waters: > Frinton; and > Holland.		No deterioration in the status of the Bathing Waters is predicted.

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