NORTH FALLS

Offshore Wind Farm

PRELIMINARY ENVIRONMENTAL INFORMATION REPORT

Appendix 21.2 Water Framework Directive Compliance Assessment

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Glossary of Acronyms

BWM	Ballast Water Management
CIRIA	Construction Industry Research and Information Association
EIA	Environmental Impact Assessment
EQSD	Environmental Quality Standards Directive
EU	European Union
GBS	Gravity-based support structures
GEP	Good Ecological Potential
GES	Good Ecological Status
GWDTES	Groundwater Dependent Terrestrial Ecosystems
HDD	Horizontal Directional Drilling
HMWB	Heavily Modified Water Body
HRA	Habitats Regulations Assessment
MARPOL	International Convention for the Prevention of Pollution from Ships
NVZ	Nitrate Vulnerable Zone
OSP	Offshore substation platforms
PBDE	Polybrominated Diphenyl Ethers
PEMP	Project Environmental Management Plan
PPG	Pollution Prevention Guidance
RBMP	River Basin Management Plan
UKTAG	UK Technical Advisory Group
WFD	Water Framework Directive

Glossary of Terminology

Aquifer	Geological strata that hold water
Coastal catchment	Land which drain directly to the coastal or estuarine waters, rather than through a river water body – not part of a river water body catchment
Geomorphology	The study of landforms and the processes that shape them
Groundwater	Water stored below the ground in rocks or other geological strata
Surface water flooding	Surface water flooding occurs when rainwater does not drain away through normal drainage systems or soak into the ground, but lies on or flows over the ground instead
Main River	Usually larger rivers and streams. The Environment Agency carries out maintenance, improvement or construction work on Main Rivers to manage flood risk
Offshore cable corridor(s)	The corridor of seabed from the North Falls south array to the landfall site within which the offshore export cables will be located
Offshore export cables	The cables which bring electricity from the array areas to the landfall.
Offshore project area	The overall area of the array areas and the offshore cable corridor.
Ordinary Watercourse	Other rivers are called 'Ordinary Watercourses'. Lead local flood authorities, district councils and internal drainage boards carry out flood risk management work on Ordinary Watercourses

1 Introduction

1.1 Project overview

1. The aim of this report is to determine whether the North Falls offshore wind farm (hereafter 'North Falls' or 'the Project') is compliant with the requirements of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (as amended), which continue to enforce Directive 2000/60/EC of the European Parliament and of the Council of 23rd October 2000. Directive 2000/60/EC establishes a framework for Community action in the field of water policy (the Water Framework Directive (WFD)) following Britain's withdrawal from the European Union (EU).

2 Assessment methodology

2. There is no detailed published methodology to assess whether strategies and plans are compliant with the requirements of the WFD and supporting UK legislation. There are, however, several sets of guidance that have been developed to support these assessments at project level in the different water body types, predominantly written by the Environment Agency. The following are the most relevant to the proposed Project:

- Planning Inspectorate (2017) Advice Note Eighteen: The Water Framework Directive, which provides an overview of the WFD and provides an outline methodology for considering WFD as part of the Development Consent Order (DCO) process;
- Environment Agency (2016a) Water Framework Directive risk assessment: How to assess the risk of your activity. Guidance for bodies planning to undertake activities that would require a flood risk activity permit;
- Environment Agency (2016b) Protecting and improving the water environment: WFD compliance of physical works in rivers and associated supplementary guidance; and
- Environment Agency (2017) Clearing the waters for all. Outlines a detailed methodology for assessing impacts on transitional and coastal water bodies.

3. For the purposes of this assessment, the broad methodologies outlined in the guidance documents listed above have been brought together to develop an assessment methodology that can be used for strategies in all types of water bodies. The assessment process therefore covers the following stages, which are described in more detail in the subsequent sections:

- Stage 1: Screening Assessment;
- Stage 2: Scoping Assessment; and
- Stage 3: Detailed Compliance Assessment.

2.1 Stage 1: Screening Assessment

4. This stage consists of an initial screening exercise to identify relevant water bodies that could be affected by the Project. Water bodies will be selected for inclusion in the early stages of the compliance assessment using the following criteria, with reference to the Anglian River Basin Management Plan (RBMP) (2015), as presented in the online Catchment Data Explorer (Environment Agency, 2022):

- All surface water bodies (river, transitional, coastal) that could potentially be directly impacted by the Project;
- Any surface water bodies that have direct connectivity (e.g., downstream) that could potentially be affected by the Project; and
- Any groundwater bodies that underlie the Project.

2.2 Stage 2: Scoping Assessment

5. This stage identifies whether there is potential for deterioration in water body status or failure to comply with WFD objectives for any of the water bodies identified in Stage 1. This stage considers potential non-temporary impacts of the Project and impacts on critical or sensitive habitats. Potential impacts on water body mitigation measures are also evaluated.

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

7. The water body and activity under assessment will be progressed to the detailed compliance assessment (Stage 3), if potential impacts on WFD quality elements cannot be ruled out. Conversely, if sufficient information can be provided at this stage to demonstrate that impacts on WFD quality elements would not occur, the quality element is scoped out of further assessment.

8. The water body and activity under assessment will be progressed to the detailed compliance assessment (Stage 3) if the answer to one or more of the scoping questions is 'Yes', but only for those quality elements that could potentially be impacted. Conversely, if the answer to a scoping question is 'No', or enough information can be provided at this stage to scope the issue out, the quality element is scoped out of further assessment.

2.3 Stage 3: Detailed Compliance Assessment

9. The Stage 3 assessment determines whether any project activities that have been put forward from Stage 2 will cause deterioration, and whether this deterioration will have a significant non-temporary effect on the status of one or more WFD quality elements at water body level. For priority substances, the process requires the assessment to consider whether the activity is likely to prevent the quality element achieving a good chemical status. If it is established that an activity or project component is likely to affect a water body (by causing deterioration or preventing achievement of WFD objectives and the implementation of mitigation measures for heavily modified water bodies (HMWBs), or that an opportunity may exist to contribute to improving status at

a water body level, potential measures to avoid the effect or achieve improvement that can be reasonably delivered within the scope of the proposed Project will be investigated.

10. Where applicable to a development, this stage considers such measures and, where necessary, evaluates them in terms of cost and proportionality in relation to the scale of the Project and the nature of any impacts. Note that this stage is referred to as a WFD Impact Assessment in the Planning Inspectorate guidance (Planning Inspectorate, 2017).

2.4 Approach to decommissioning

11. No decision has yet been made regarding the final decommissioning policy for onshore and offshore project infrastructure. It is recognised that legislation and industry best practice change over time.

12. It is likely that the onshore project equipment, including the cable, will be removed, reused, or recycled where possible and the transition bays and cable ducts being left in place.

13. The following offshore infrastructure is likely to be removed, reused or recycled where practicable:

    i. Turbines including monopile, steel jacket and gravity-based support structures (GBS) foundations;

    ii. Offshore substation platforms (OSPs) including topsides and steel jacket foundations; and

    iii. Offshore cables may be removed or left in situ depending on available information at the time of decommissioning.

14. The following offshore infrastructure is likely to be decommissioned in situ depending on available information at the time of decommissioning:

    i. Scour protection;

    ii. Offshore cables may be removed or left in situ; and

    iii. Crossings and cable protection.

15. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator. It is anticipated that for the purposes of a worst case scenario, the impacts will be no greater than those identified for the construction phase.

16. For the purposes of this assessment it is assumed that:

- The same water bodies screened into the assessment for construction and operation (3.1) would also be affected during decommissioning – no additional water bodies would be affected;
- Scoping answers would be the same for decommissioning as for construction and operation (Section 3.2) – no additional quality elements for river, coastal or groundwater bodies would be scoped in or out;

- Detailed compliance assessment results (Section 4) and overall conclusions (Section 5) would be the same for decommissioning as for construction and operation – the Project would be compliant with WFD requirements.

2.5 Determination of deterioration

17. The Environment Agency has not issued guidance on how deterioration in the status of water bodies should be assessed. The assessment therefore draws upon the following guidance documents:

    - National Infrastructure Planning (2017) Advice Note Eighteen: The Water Framework Directive. Provides an introduction to the WFD's legal context and obligations, the relationship with other assessments (EIA, HRA), and advice regarding consultation when preparing a DCO application in respect of the WFD;
    - The Water Framework Directive (Standards and Classification) Directions (England and Wales) (2017): Provides the most up to date standards used to determine the ecological and chemical status of surface water bodies, and the quantitative and chemical status of groundwater;
    - UKTAG (2011) Defining and Reporting on Groundwater Bodies: Provides information on the approaches used to classify groundwater bodies;
    - Joint Defra/EA Flood and Coastal Erosion Risk Management Research and Development Programme (2009) WFD Expert Assessment of Flood Management Impacts: Provides a framework for the assessment of changes to hydromorphology;
    - UKTAG (2003) Guidance on Morphological Alterations and the Pressures and Impacts Analyses: Provides additional information on hydromorphological pressures;
    - Environment Agency guidance on WFD deterioration and risk to the status objectives of river water bodies (Environment Agency, 2016a): Provides an assessment of the level of risk of deterioration in water body status associated with different activities, based upon activity type and risk screening thresholds; and
    - The assessment considers the potential for deterioration in water body status between classes, within classes, and including temporary deterioration. Where deterioration is not predicted, the activity will also be considered against the water body objectives to ensure status objectives (i.e., Good Ecological Status (GES) or Good Ecological Potential (GEP)) will not be prevented.

2.6 Article 4.7

18. In the unlikely event that no suitable measures can be identified to mitigate potential adverse impacts of the Project, it may be necessary to present a case for a derogation under Article 4.7 of the WFD. It should be noted that the Project would look to prevent deterioration in water body status in the first instance (e.g., through project design and, where necessary, the adoption of further mitigation measures) therefore avoiding the need for an application for an

exemption under Article 4.7. To determine the scope of any assessment required to demonstrate compliance with the requirements of Article 4.7, consultation with the Environment Agency would be required. However, at this stage, it is envisaged that this assessment would include an assessment of whether:

- The Project can be classified as being of imperative overriding public interest and whether the benefits to society resulting from the Project outweigh the local benefits of WFD implementation.
- All practicable steps to avoid adverse impacts have been taken. These steps are defined as those that are technically feasible, not disproportionately costly, and compatible with the overall requirements of the Project (as defined under the WFD).
- The Project can be delivered by an alternative, environmentally better option (as defined under the WFD and discussed in the Planning Inspectorate (2017) guidance). This option will need to be technically feasible and not disproportionately costly to be feasible.

3 Results

3.1 Stage 1: Screening

3.1.1 Description of activity

19. The Project comprises the following components that have been screened to identify whether they could potentially affect water bodies:

- **Construction**
    - i. Offshore project area
        - i. Offshore cable corridor (out to 1 nautical mile)
    - ii. Onshore project area
        - i. Landfall
        - ii. Onshore cable corridor(s)
        - iii. Onshore substation
- **Operation and maintenance**
    - iii. Offshore project area (out to 1 nautical mile)
        - i. Offshore cable protection: Remedial protection measures could include rock or gravel burial, concrete mattresses, flow energy dissipation devices, dredged sandy material, protective aprons or coverings, or bagged solutions (geotextile sand containers, rock-filled gabion bags or nets, grout bags filled with material sourced from the site or elsewhere); and
        - ii. Cable repairs: During the life of the Project, there should be no need for scheduled repair or replacement of the subsea cables,

however, reactive (unscheduled) repairs and periodic inspection may be required.

iv. Onshore project area

i. Onshore export cables should not need to be repaired or replaced but they will be maintained throughout their life. Access to the onshore export cables to conduct emergency repairs may be required, as necessary;

ii. Electrical equipment at the onshore substation will be maintained throughout the life of the Project as necessary.

- **Decommissioning**

v. It is anticipated that for the purposes of a worst case scenario, the impacts will be no greater than those identified for the construction phase (see Section 2.4).

3.1.2 Identification of water bodies

20. WFD river, coastal and groundwater water bodies that could potentially be affected by the Project are listed in Table 1 and shown in Figures 21.1 and 21.2 (Volume II). Water bodies have been screened into the assessment in response to the proposed works being close to and/or hydrologically connected to water bodies.

Table 1 Water bodies screened into the assessment

Water Body Name	Water Body Type	Description	Screened In/Out	Reason for screening decision
Holland Brook (GB105037077810)	River	Heavily modified water body at Moderate ecological potential due to Moderate classifications for phosphate and mitigation measures assessment, and Poor classifications for fish and invertebrates. Chemical status is Fail due to high levels of priority hazardous substances (Polybrominated Diphenyl Ethers (PBDE), mercury and its compounds).	In	Components of the Project will be located within this water body.
Tenpenny Brook (GB105037041310)	River	Heavily modified water body at Moderate ecological potential due to Moderate classifications for invertebrates, a Poor classification for fish and a Bad classification for phosphate. Chemical status is Fail due to high levels of priority hazardous substances (PBDE, mercury and its compounds).	In	Components of the Project will be located within this water body.
Wrabness Brook (GB105036040800)	River	Heavily modified water body at Good ecological potential but does not support a good hydrological regime. Chemical status is Fail due to high levels of priority	In	Components of the Project could be located within this water body.

Water Body Name	Water Body Type	Description	Screened In/Out	Reason for screening decision
		hazardous substances (PBDE, mercury and its compounds).		
Essex (GB650503520001)	Coastal	Heavily modified water body at Moderate ecological potential due to a Moderate classification for dissolved inorganic nitrogen and Moderate or less for mitigation measures assessment. Chemical status is Fail due to high levels of priority hazardous substances (PBDE, mercury and its compounds).	In	Components of the Project will be located within this water body.
Hamford Water (GB680503713700)	Coastal	Water body not designated artificial or heavily modified. At Moderate ecological status due to Moderate classifications for invertebrates, phytoplankton and dissolved inorganic nitrogen. Chemical status is Fail due to high levels of priority hazardous substances (PBDE, mercury and its compounds).	Out	Although the onshore project area is immediately (450 m) upstream of the water body, there will be no construction in Hamford Water. The Main River that flows to Hamford Water (and is crossed by the onshore project area) will be crossed using HDD methods. No impacts are anticipated downstream in Hamford Water.
Essex Gravels (GB40503G000400)	Groundwater	Groundwater body at Poor overall status due to Poor classifications for chemical status element and general chemical test.	In	Components of the Project will be located within this groundwater body.

3.2 Scoping

21. The aim of this section is to highlight the quality elements within each water body that could be impacted by the Project (construction and operation), as identified in Stage 1 of the WFD compliance assessment (Table 2). This assessment therefore determines the scope for any future detailed compliance assessment (Stage 3) which may be required for the Project.

22. Potential impacts of the Project on WFD quality elements for river, coastal and groundwater bodies are presented in Sections 3.2.1, 3.2.2, and 3.2.3. Section 3.3 evaluates impacts on RBMP improvement and mitigation measures, and Section 3.4 discusses protected areas that could be affected by the Project. Section 3.5 provides a summary of Stage 2 scoping.

23. For decommissioning, it is anticipated that for the purposes of a worst case scenario, the impacts will be no greater than those identified for the construction phase (See Section 2.4). Scoping answers would be the same for decommissioning as for construction and operation (Section 3.2) – no additional quality elements for river, coastal or groundwater bodies would be scoped in or out.

3.2.1 River water bodies

Table 2 Scoping assessment for river waterbodies

Parameter	Scoping question	Scoping assessment	Decision
Water bodies assessed: Holland Brook (GB105037077810), Tenpenny Brook (GB105037041310), Wrabness Brook (GB105036040800)			
Project components assessed: Onshore project area (landfall, onshore cable corridor(s), onshore substation)			
Biology	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or modification of habitats for aquatic plants?	**Construction** Impacts from ground disturbance for cable trenching (open-cut and HDD) (including use of a temporary haul road) and construction of the onshore substation could increase the amount of fine sediment in water bodies. This could smother bed habitats and reduce light penetration. This could also lead to the loss or modification of aquatic flora communities. Changes to physico chemistry from proposed onshore construction activities could also lead to loss or modification of habitats for aquatic plants.	In
		Operation Impacts from localised operational maintenance activities could have potential impacts on morphology and the hydrological regime. Increased fine sediment via surface runoff to water bodies could smother bed habitats and reduce light penetration. This could lead to loss or modification of aquatic flora communities. Changes to physico chemistry from operational activities could also lead to loss or modification of habitats for aquatic plants.	
	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or modification of habitats for aquatic invertebrates?	**Construction** Increased fine sediment inputs to the water body originating from ground disturbance for cable trenching (open-cut and HDD) (including use of a temporary haul road) and construction of the onshore substation, could smother bed habitats and reduce light penetration. This could lead to the loss or modification of habitats which support benthic invertebrates. Changes to physico-chemistry from onshore construction activities could also lead to loss or modification of aquatic invertebrate habitat.	In
		Operation Impacts from operational maintenance activities could have potential impacts to morphology and the hydrological regime. Increased fine sediment via surface runoff to the water body could smother bed habitats and reduce light penetration. This could lead to loss or modification of aquatic invertebrate communities. Changes to physico chemistry from operational activities could also lead to loss or modification of habitats for benthic invertebrates.	
	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or lead to the direct loss or	**Construction** and **operation** Increased turbidity due to increased fine sediment loads from onshore construction and operational maintenance activities could alter niche habitats and lead to the loss or modification of shelter, feeding and spawning habitats for fish. Furthermore, potential changes to physico-chemistry could also reduce the capacity of the water body to support feeding and spawning fish.	In

Parameter	Scoping question	Scoping assessment	Decision
	modification of shelter, feeding and spawning habitats for fish?		
Hydromorphology	Could the activity change the volume, energy or distribution of flows in the water body?	**Construction** Ground disturbance for cable trenching (open-cut and HDD) and changes to land use from temporary construction areas and the onshore substation could potentially alter the hydrological regime of river water bodies screened into the assessment. More impermeable surfaces and disturbed ground could alter surface water drainage pathways, resulting in changes to the volume, energy or distribution of flows. **Operation** Permanent onshore infrastructure could change surface water drainage patterns which has the potential to affect the hydrological regime of nearby WFD water bodies.	In
	Could the activity change the width, depth, bank conditions, bed substrates and structure of the riparian zone?	**Construction** Ground disturbance for cable trenching (open-cut and HDD) and changes to land use from temporary construction areas and onshore substation are likely to increase fine sediment input to water bodies, which could have impacts on hydromorphology. Any increase in surface runoff has the potential to increase scour to the bed and banks and structure of the riparian zone. **Operation** The permanent onshore infrastructure could change surface water drainage patterns and have the potential to affect the morphological conditions of nearby WFD water bodies through increased bed and bank erosion. Morphology of water bodies could also be impacted by increased sediment supply via runoff from any planned or unplanned operational maintenance activities.	In
	Could the activity create a permanent barrier to the downstream movement of water and/or sediment, or the upstream movement of fish?	**Construction** and **operation** Onshore infrastructure will not create a permanent barrier to the downstream movement of water or sediment, or the upstream movement of fish. Although temporary barriers to river continuity may be required during construction (e.g., to facilitate watercourse crossings), they would be removed following construction and any effects would be reversed.	Out
Physio-chemistry and chemistry	Could the activity change the temperature, pH, oxygenation, salinity or nutrient concentrations in the water body?	**Construction** There is potential for increased sediment supply, which could impact on turbidity levels and oxygenation within the water body. There will also be increased risk of contaminant supply to water bodies, from accidental spillage or leakage of fuel oils or lubricants from construction vehicles. This has the potential to impact on physico chemistry. **Operation** Maintenance of the onshore cable infrastructure at operational sites could increase sediment supply to the water bodies. There is also a risk of contaminants and spillage from vehicles during operation.	In
	Could the activity release dangerous chemicals into the water body?	**Construction** and **operation** The construction and any maintenance machinery in or adjacent to water bodies has the potential to accidentally release lubricants, fuels and oils into a surface water body. This could also be caused by spillage, leakage and in-wash from vehicle storage areas following rainfall, accidental release of foul	In

Parameter	Scoping question	Scoping assessment	Decision
		waters (e.g., from welfare facilities) and construction materials, such as concrete and inert drilling fluids from trenchless crossings. Dangerous chemicals could also be released from construction materials (e.g., concrete).	

3.2.2 Coastal water bodies

Table 3 Scoping assessment for coastal waterbodies

Parameter	Scoping question	Scoping assessment	Decision
Water bodies assessed: Essex (GB650503520001)			
Project components assessed: Offshore project area (offshore cable corridor, cable protection)			
Biology	Is the footprint of the activity 0.5 km^2 or larger?	**Construction** The area of Essex coastal water body occupied by the offshore project area is approximately 12.5 km^2. However, the actual footprint over which the effects will occur will be significantly smaller once the cable corridor has been refined: The PEIR chapters estimate a disturbance area of 24 m in width. The distance of cable required between landfall and the 1 nm boundary is approximately 11 km – overall, the estimated area of disturbance is 0.024 x 11 = 0.264 km^2. The impact area will therefore not be greater than 0.5km^2.	Out
		Operation The maximum indicative width of rock berm cable protection required is 6 m and a worst case scenario of 10% within the WFD water body will require cable protection has been assumed. This equates to 0.0066 km^2 of the WFD water body.	Out
	Is the area of either activity greater than 1% or more of the water body's area?	**Construction** The area of Essex coastal water body occupied by the offshore export cable corridor is approximately 12.5 km^2 and the coastal water body is 1196 km^2 (1.05%). However, as outlined above, the estimated area of disturbance is 0.264km^2. This reduces the area disturbed to below 1% of the WFD water body.	Out
		Operation As outlined above, the maximum indicative width of rock berm cable protection required equates to 0.0066km^2 of the WFD water body. This is significantly less than 1% of the area of the water body.	Out
	Within 500m of any higher sensitivity habitat?	**Construction** The export cable corridor benthic ecology survey did not indicate any areas of higher sensitivity habitats within the Essex coastal water body (see Chapter 10 Benthic and Intertidal Ecology, Volume I).	Out

Parameter	Scoping question	Scoping assessment	Decision
		Operation The export cable corridor benthic ecology survey did not indicate any areas of higher sensitivity habitats within it (see Chapter 10 Benthic and Intertidal Ecology, Volume I).	Out
	1% or more of any lower sensitivity habitat?	**Construction** The offshore project area is predominantly characterised by two lower sensitivity habitats: gravel and cobbles (intertidal and subtidal coarse sediment A2.1, A5.1) and subtidal soft sediment (Sand, Mud & Mixed A2.2, A2.3, A2.4) (see Chapter 10 Benthic and Intertidal Ecology, Volume I). Whilst cable installation may temporarily disturb these communities, the species found in these biotopes are typical of habitats exposed to sediment disturbance (e.g., as a consequence of wave action), so the species present are resilient and have low to medium sensitivities to physical changes in the environment. It is therefore concluded in Chapter 10 Benthic and Intertidal Ecology (Volume I), that they are likely to recover. Impacts on more than 1% of lower sensitivity habitats in this water body as a result of cable installation are therefore not predicted.	Out
		Operation The worst case scenario of 10% of the cable within the WFD water requiring cable protection equates to 0.0066 km^2 of the WFD water body. If it is assumed that the entirety of this area is within each of the lower sensitivity habitats identified, it can be calculated that for gravel and cobbles, the area impacted would be 0.06% and for subtidal soft sediments 0.0001% (figures for habitat areas taken from Clearing the Waters for All summary tables, Environment Agency 2017).	Out
	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?	**Construction** Activity in the coastal water body is over 10 km away from the closest estuary (Stour Estuary). There will be an increase in suspended sediment concentrations because of transition pit works associated with subtidal HDD exit point, and cable burial techniques to facilitate cable installation. However, this effect will be minor and temporary, and highly unlikely to impact the estuary given the distance involved. Effects on environmental parameters that could impact on fish are not predicted.	Out
		Operation During the operational phase, whilst there may be low volumes of sediments disturbed during maintenance activities, reduced sediment plumes with lower volumes would give rise to smaller impacts than those described in construction. The presence of unburied cable protection will not impact fish.	Out
	Could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical	**Construction** and **operation** The area of construction work within the water body would be small scale and would occur in an open area of coastline. This would therefore not create a physical barrier to fish. Although potentially significant impacts have been for the spawning grounds of Downs herring (see Chapter 13 Fish and Shellfish Ecology, Volume I), spawning grounds are located immediately to the east of	Out

Parameter	Scoping question	Scoping assessment	Decision
	change or a change in depth or flow)?	the southern array area with limited overlap with the offshore project area. This area is approximately 50km offshore and outside the area assessed under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. For operational activities, impacts on fish are not predicted.	
	Could cause entrainment or impingement of fish?	**Construction** and **operation** No mechanism for fish entrainment or impingement has been identified for construction or operation.	Out
	Could introduce or spread Invasive non-native species (INNS)?	**Construction** and **operation** The risk of spreading INNS will be reduced by employing biosecurity measures in accordance with the following requirements: • International Convention for the Prevention of Pollution from Ships (MARPOL). The MARPOL sets out appropriate vessel maintenance; • The International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention), which provide global regulations to control the transfer of potentially invasive species; and • The Environmental Damage (Prevention and Remediation (England) Regulations 2015, which set out a polluter pays principle where the operators who cause a risk of significant damage or cause significant damage to land, water or biodiversity will have the responsibility to prevent damage occurring, or if the damage does occur will have the duty to reinstate the environment to the original condition.	Out
Hydromorphology	Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status?	**Construction** and **operation** No, the water body is not at high status.	Out
	Could significantly impact the hydromorphology of any water body?	**Construction** and **operation** The export cables would be brought ashore and jointed to the onshore cables within transition pits using horizontal directional drilling (HDD) and duct installation. Given the use of HDD, effects in the coastal water body are not predicted. For operational activities, cable protection could potentially effect hydromorphological parameters. However, given the small area of cable protection potentially required in the water body, this is only likely to lead to relatively localised effects and would unlikely cause a change to hydromorphological parameters on a water body scale.	Out

Parameter	Scoping question	Scoping assessment	Decision
	Is in a water body that is heavily modified for the same use as your activity?	**Construction** and **operation** No – the water body is designated heavily modified for flood defence	Out
Physico-chemistry and chemistry	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** There will be an increase in suspended sediment concentrations because of transition pit works associated with the subtidal HDD exit point and cable burial techniques to facilitate cable installation. These activities could increase turbidity however, these effects will be short-lived, temporary and likely to be within natural baselines already experienced in the water body during storm conditions. **Operation** During the operational phase, whilst there may be low volumes of sediments disturbed during maintenance activities, the reduced sediment plumes with the lower volumes would give rise to smaller impacts than those described in construction. The presence of unburied cable protection will not impact water quality.	Out
	Is in a water body with a phytoplankton status of moderate, poor or bad?	**Construction** and **operation** No, phytoplankton status is High (2019 classification).	Out
	Is in a water body with a history of harmful algae?	**Construction** and **operation** Essex coastal water body has a history of harmful algae. However, the proposed works would not impact on parameters likely to increase levels of harmful algae.	Out
	The chemicals are on the Environmental Quality Standards Directive (EQSD) list?	**Construction** and **operation** No chemicals would be directly released from potential works associated with the Project. Best practice measures will be used to reduce the likelihood of spillages during construction and operation/maintenance.	Out
	It disturbs sediment with contaminants above Cefas Action Level 1?	**Construction** and **operation** Site specific data collected to inform the EIA indicates that, with the exception of arsenic, sediment contaminant concentrations are low (Chapter 9 Marine Water and Sediment Quality, Volume I). Where exceedances of sediment guidelines occur, these are generally marginal (i.e. only just above the lower guideline level value). With respect to arsenic, contextual information available indicates that these levels are close to the range identified as being typical for the area. Additionally, sediments are not predicted to remain in suspension for long periods of time given that the seabed material is predominantly sand/gravel and as such the risk of exposure to the water column for partitioning to occur is also reduced. Consequently, long term impacts on water quality are not predicted.	Out

Parameter	Scoping question	Scoping assessment	Decision
		During the operational phase, whilst there may be low volumes of sediments disturbed during maintenance activities, the reduced sediment plumes with the lower volumes would give rise to smaller impacts than those described in construction.	

3.2.3 Groundwater bodies

Table 4 Scoping assessment for groundwater bodies

Parameter	Scoping question	Scoping assessment	Decision
Water body assessed: Essex gravels (GB40503G000400)			
Project components assessed: Onshore project area (landfall, onshore cable, onshore substation)			
Groundwater quantity	Will the activity change groundwater levels affect Groundwater Dependent Terrestrial Ecosystems (GWDTEs) or dependent surface water features?	**Construction** and **operation** During construction of the onshore cable corridor(s), subsurface HDD methods used to cross watercourses could cause localised changes to groundwater flows. There may be local changes to infiltration rates into the groundwater bodies due to installation of buried infrastructure causing alterations to subsurface flow routes. However, these changes are not expected to have permanent impacts on GWDTEs or dependent surface water features.	Out
	Will the level of proposed groundwater abstraction exceed recharge at a water body scale?	**Construction** and **operation** No consumptive abstraction is planned, and there will be no mechanism for impact on groundwater recharge. Any groundwater abstraction would be limited to localised dewatering of near-surface groundwaters during subsurface excavations in the construction phase.	Out
	Could the activity lead to saline intrusion?	**Construction** and **operation** No construction or operational activities will abstract any water from the groundwater bodies identified, and therefore, will not result in saline intrusion.	Out
	Could the activity lead to an additional surface water body that will become noncompliant and lead to failure of the dependent surface water test?	**Construction** and **operation** No construction or operational activities will abstract any water from the groundwater bodies identified.	Out
	Could the activity result in additional abstraction that will exceed any groundwater body scale headroom between the fully licensed quantity and the limit	**Construction** and **operation** No consumptive abstraction is planned, and there will be no mechanism for impact on groundwater recharge. Any groundwater abstraction would be limited to localised dewatering of near-surface groundwaters during subsurface excavations in the construction phase.	Out

Parameter	Scoping question	Scoping assessment	Decision
	imposed by the total recharge?		
Groundwater quality	Will the activities have the potential to result in or exacerbate widespread diffuse pollution at a water body scale?	**Construction** and **operation** If any pollution from project construction and operation does accidently occur, this will be limited to a very small proportion of both groundwater bodies identified (highly localised (i.e., not widespread)) and will not have an impact at the water body scale.	Out
	Will the activities have the potential to result in pollution of GWDTEs or cause deterioration in the quality of a drinking water abstraction?	**Construction** and **operation** Activities such as HDD and open cut trench excavations to construct the onshore cable corridor(s) could potentially introduce contaminants into the groundwater bodies identified. This could lead to an increase in pollutant concentrations affecting the quality of licensed and unlicensed abstractions.	In
	Could the activities have the potential to result in increasing trends in pollutant concentrations or reduce the ability of the water body being able to reverse significant trends in groundwater pollutants?	**Construction** and **operation** Construction of the onshore export cable from open cut trench excavations and HDD could potentially introduce contaminants into groundwater. This could lead to an increase in pollutant concentrations within the groundwater bodies identified.	In
	Will the activity lead to saline intrusion?	**Construction** and **operation** No construction or operational activities will abstract any water from the groundwater bodies identified, and therefore, will not result in saline intrusion.	Out

3.3 Impacts on RBMP improvement and mitigation measures

24. The Environment Agency has not published any details of improvement measures that are required to improve the status of the water bodies that have been scoped in. However, the Environment Agency has identified the mitigation measures that are required to achieve GEP in the catchments of Holland Brook, Tenpenny Brook, Wrabness Brook, and the Essex coastal catchment. These are listed in Table 5.

25. Measures in river water body are intended to address physical modification pressures associated with land drainage and flood protection use (i.e., the reason why the water body was designated as heavily modified). Measures in the coastal water body are intended to address physical modification pressures associated with flood protection use and coast protection use.

26. Although the Project involves localised construction works within these water bodies, the very limited impacts on hydromorphology mean that there is no mechanism to affect the proposed measures. There would also be no mechanism to affect the maintenance and sediment management measures listed in Table 5. The future implementation or effectiveness of mitigation measures will not be affected.

27. For decommissioning, it is anticipated that for the purposes of a worst case scenario, the impacts will be no greater than those identified for the construction phase (See Section 2.4). There would be no mechanisms to affect the proposed measures during decommissioning.

Table 5 Water body mitigation measures

Water body	Measure	Type
Measures in place		
Holland Brook	Retain habitats	River
Tenpenny Brook	Maintenance – minimise habitat impact	River
Tenpenny Brook, Wrabness Brook	Maintenance – prevent sediment transfer	River
Holland Brook, Tenpenny Brook, Wrabness Brook	Selective vegetation control	River
Holland Brook, Tenpenny Brook, Wrabness Brook	Vegetation control	River
Holland Brook, Tenpenny Brook, Wrabness Brook	Vegetation control timing	River
Holland Brook, Tenpenny Brook, Wrabness Brook	Invasive species techniques	River
Holland Brook, Tenpenny Brook, Wrabness Brook	Sediment management strategy	River
Measures not in place		
Holland Brook	Floodplain connectivity	River
Holland Brook	Fish passes	River
Holland Brook	Remove obsolete structure	River
Holland Brook	In-channel morphological diversity	River
Essex	Realign flood defence	Coastal

3.4 Impacts on protected areas

28. All WFD water-dependent protected areas associated with water bodies identified in the screening assessment are shown Annex 21.2.1 and evaluated below for construction and operation phases of the Project. For decommissioning, it is anticipated that for the purposes of a worst case scenario, the impacts will be no greater than those identified for the construction phase (see Section 2.4). No other protected areas would be scoped in or out of the assessment for decommissioning.

3.4.1 Bathing waters

29. Accidental spillage of chemicals from construction materials and machinery and temporary sediment plumes associated with cabling could affect bathing waters. There are eight bathing water protected areas within the Essex water body, although only two of these (Holland and Frinton) are within the offshore project area. With embedded mitigation in place (Table 6) and implementation of a Project Environmental Management Plan (PEMP), effects from accidental spills are not predicted.

30. Additionally, whilst sediment plumes may temporarily impact on bathing waters, as predicted in Chapter 9 Marine Sediment and Water Quality (Volume I), it is likely that the increase in concentrations would be greatest in the shallowest sections of the export cable corridor, where background concentrations are also greater. The effect is also predicted to be short term and cease following completion of the cabling activities. Bathing waters are therefore scoped out of the assessment.

3.4.2 Nitrates

31. Foul drainage from construction and operational welfare facilities will be tankered off-site for treatment, preventing impacts to Nitrate Vulnerable Zones (NVZs). The construction site drainage systems will also prevent increasing nitrate volumes from entering the surface drainage network following soil excavations. The construction and operation activities are therefore unlikely to significantly alter NVZ nitrate and nutrient concentrations. Impacts on NVZs and urban wastewater are scoped out of the assessment.

3.4.3 Shellfish waters

32. There are no shellfish waters within 2km of the offshore or onshore project areas.

3.4.4 Habitats and Species Directive, Conservation of Wild Birds Directive

33. Potential impacts on protected areas under the Habitats and Species Directive and the Conservation of Wild Birds Directive will be considered in detail in the separate Habitat Regulations Assessment (HRA) and will not be considered further in this WFD assessment.

3.5 Stage 2 summary

34. Stage 2 scoping has established that activities associated with the Project in the following water bodies should be taken forward to Stage 3 Detailed Compliance Assessment:

- River water bodies (all quality elements)
  a. Holland Brook
  b. Tenpenny Brook
  c. Wrabness Brook
- Groundwater body (groundwater quality element)
  a. Essex Gravels

4 Stage 3: Detailed compliance assessment

35. This section presents results of the preliminary impact assessment undertaken on the water bodies identified in Section 3 of this report for construction and operation phases, using the method outlined in Section 2. This assessment determines whether elements of the Project brought forward from Stage 2 would cause deterioration of WFD water bodies listed in Section 3.5, and whether such deterioration would have a significant non-temporary effect on the status of one or more WFD quality elements at a water body level.

36. For decommissioning, it is anticipated that for the purposes of a worst case scenario, the impacts will be no greater than those identified for the construction phase (See Section 2.4). Detailed compliance assessment results (Section 4) and overall conclusions (Section 5) would be the same for decommissioning as for construction and operation.

4.1 Embedded control measures

37. The detailed compliance assessment has been informed by embedded control measures established for Chapter 21 Water Resources and Flood Risk (Volume I) of the PEIR. Table 6 shows embedded project control measures for water resources.

Table 6 Onshore water resources embedded control measures

Parameter	Control measures embedded into North Falls design
Watercourse crossings (construction)	
Cable crossings beneath watercourses	All Main Rivers will be crossed using trenchless techniques such as HDD to avoid direct interaction with these watercourses. Most Ordinary Watercourses will also be crossed using trenchless techniques.
Temporary access across watercourses	Temporary bridges may be used as options to traverse Main Rivers where direct access is not readily available from both sides. Culverts will not be used to cross Main Rivers. Selection of a crossing technique for Ordinary Watercourses not

Parameter	Control measures embedded into North Falls design
	crossed using trenchless techniques will be dependent on local site conditions and may include the use of temporary culverts. Temporary culverts will be adequately sized to avoid impounding flows (including allowing for increased winter flows as a result of climate change).
Trenched crossings	Best practice measures at trenched crossings include: • Either temporary dams or flumes are used to divert water during trenched installation; • Where temporary dams are used: • Prior to dewatering the area between the temporary dams, a fish rescue would be undertaken; • Flumes or pumps would be adequately sized to ensure that flows downstream are maintained whilst minimising upstream impoundment; • The amount of time that temporary dams or flumes are in place will be kept to a minimum; • Scour protection would also be used to protect the river bed downstream of the dam from high energy flow at the outlets of flumes and pumps; and • Sympathetic reinstatement of channel and banks.
Agricultural drainage	The Applicant will appoint a land drainage consultant to develop pre-and post-construction drainage plans. Additionally, land drainage systems will be maintained during construction and land drainage would be reinstated following completion of construction works during the reinstatement phase. An Outline Code of Construction Practice (OCoCP) will be submitted with the DCO application and this will include outline soil management measures and outline the mitigation measures and best practice techniques, which contractors would be obliged to comply with. The DCO will contain a requirement to submit a final CoCP and Soil Management Plan (SMP) (which must be in accordance with the OCoCP) prior to commencement of construction.
Exposed land (construction and operational maintenance)	
Sediment supply to watercourses	Construction activities will adhere to industry good practice measures as detailed in the Environment Agency's Pollution Prevention Guidance (PPG) notes (PPG1, PPG5, PPG8 and PPG21). Although EA PPG notes have been revoked in England, they have been updated as Guidance for Pollution Prevention (GPP notes) for use in Scotland and Northern Ireland (NetRegs, 2022). Updates are included in the measures listed below. Construction Industry Research and Information Association (CIRIA) best practice (Control of water pollution from construction sites: Guidance for consultants and contractors (C532) (2001)) will also be adhered to. Specific measures potentially include: • Minimising the amount of time stripped ground and soil stockpiles are exposed; • Only removing vegetation from the area that needs to be exposed in the near future; • Seeding or covering stockpiles; • Using geotextile silt fencing at the toe of the slope, to reduce the movement of silt – this should be installed before soil stripping has begun and vehicles start tracking over the site;

Parameter	Control measures embedded into North Falls design
	• On-site retention of sediment to be maximised by routing all drainage through the site drainage system; • Include measures to intercept sediment runoff at source in the drainage system using suitable filters to remove sediment from water discharged to the surface drainage network; • Plant and wheel washing is carried out in a designated area of hard standing at least 10mfrom any watercourse or surface water drain, rock outcrop (hard rock at surface) or karstic sinkhole; • Traffic movements would be restricted to minimise surface disturbance; • Divert clean water away from the area of construction work in order to minimise the volume of contaminated water; and • Routing the cable to avoid water resources and flood risk receptors where possible. In locations where large areas of exposed ground lie adjacent to watercourses, buffer strips of vegetation will be retained where possible to prevent runoff. Other embedded best practice measures include: • Limiting the extent of open excavations along the onshore cable corridor(s) to short sections of adequate length to carry out excavation and installation and there is no need for tracking over the trench sections at any one time (work fronts); and • Temporary works areas (e.g., construction compounds and trenchless crossing areas) within the onshore development area may comprise hardstanding of permeable material, such as gravel aggregate or alternatively matting/timber or similar, underlain by geotextile or another suitable material to a minimum of 50% of the exposed area. This would minimise the area of open ground.
Supply of contaminants (construction and operational maintenance)	
	Specific measures relevant to the prevention of contaminant supply to water bodies will prevent the immediate discharge of contaminated water and sediment from the onshore cable corridor into the surface drainage network, and include: • Situating concrete and cement mixing and washing areas at least 10m away from the nearest water body. These areas will incorporate settlement and recirculation systems to allow water to be re-used. All washing out of equipment would take place in a contained area and the water collected for disposal off-site; • Storing all fuels, oils, lubricants and other chemicals in impermeable bunds with at least 110% of the stored capacity, with any damaged containers being removed from site. Refuelling would take place in a dedicated impermeable area, using a bunded bowser, located at least 10m away from the nearest water body; • Ensuring that spill kits are available on site at all times as well as sand bags and stop logs for deployment on the outlets from the site drainage system in case of emergency spillages; • Foul drainage (e.g., from construction welfare facilities) will be collected through mains connection to an existing mains sewer (if such a connection is available) or collected in a septic tank located within the

Parameter	Control measures embedded into North Falls design
	DCO order limits and transported off site for disposal at a licensed facility with appropriate treatment capacity within its existing permit; • Construction drainage will be developed and implemented to minimise water within the cable trench and ensure ongoing drainage of surrounding land. Water filling the trenches would be appropriately treated to ensure no adverse effects on the local watercourses. Existing agricultural drainage would be reinstated to include the replacement of any drains that were damaged during the construction process; • Potential contaminants will be stored under cover to prevent rainwater carrying pollutants away; and • Potential contaminants will be stored in a safe place away from vehicles, to prevent collisions. In addition, buffer strips of vegetation will be retained adjacent to water bodies where possible, to intercept any contaminated runoff. To protect groundwater bodies, excavation will be shallow, except where below road or rail infrastructure and water bodies, where it may be deeper.
Changes to surface and groundwater flows and flood risk (construction and operational maintenance)	
Surface water runoff	• Changes in surface water runoff resulting from the increase in impermeable area following construction of the onshore cable corridor(s) and particularly the onshore substation would be attenuated and discharged at a controlled rate, in consultation with the LLFA and the Environment Agency, and potentially Anglian Water (if a connection to their drainage infrastructure is required during construction of the onshore substation). An Operational Surface Water and Drainage Plan will be developed in consultation with the relevant regulators and approved by the relevant planning authority; • As described above for watercourse crossings, the Applicant will appoint a land drainage consultant to develop pre-and post-construction drainage plans. Land drainage systems will be maintained during construction and land drainage would be reinstated following completion of construction works during the reinstatement phase. An OCoCP including outline soil management measures will be submitted with the DCO and the DCO will contain a requirement to submit a final CoCP and SMP prior to commencement of construction. • Construction drainage will be developed and implemented to minimise water within the cable trench and ensure ongoing drainage of surrounding land. Water filling the trenches would be appropriately treated to ensure no adverse effects on the local watercourses. Existing agricultural drainage would be reinstated to include the replacement of any drains that were damaged during the construction process; and • As described for watercourse crossings, temporary culverts will be adequately sized to avoid impounding flows.
Groundwater quality and abstractions for public water supply (construction and operational maintenance)	

Parameter	Control measures embedded into North Falls design
Cable routing	• The onshore cable corridor(s) has been developed to avoid interaction with Groundwater Source Protection Zone 1, and therefore minimise the potential for impact on abstractions for public water supply; • Ground investigations and a hydrogeological risk assessment meeting the requirements of The Environment Agency's approach to groundwater protection (Environment Agency, 2018), will be undertaken at each major HDD crossing location; and • A written scheme dealing with contamination of any land and groundwater will be submitted and approved by the relevant planning authority before construction activities commence.

4.2 River water bodies

4.2.1 Hydromorphology (hydrological regime and morphological conditions)

4.2.1.1 Construction activities

38. There is the potential for construction activities to alter surface water flows entering river water bodies. An increase in areas of hard-standing associated with the haul road, onshore substation and temporary compound areas could change flow conveyance pathways. This could result in localised changes to the volume, energy or distribution of flows of the identified water bodies. Such an increase in surface runoff could potentially increase local bed and bank scour.

39. Greater levels of fine sediment could be released directly into watercourses, predominantly from ground disturbance and vegetation cover removal associated with construction. This could result in increased sediment deposition and smothering of existing substrates. However, all water bodies surveyed during the geomorphological baseline survey (Appendix 21.1, Volume III) are low energy (depositional) environments and bed substrates are typically fine (silts and clays) – none of the surveyed watercourses have clean gravel substrates that could be smothered. Baseline fine sediment supply is likely high in most catchments, associated with evidence of channel maintenance (vegetation clearance and desilting) and the dominance of arable land use.

40. The onshore cable corridor(s) will use trenchless methods to cross main rivers and some ordinary watercourses. Open cut trenching methods may also be used to cross some ordinary watercourses. In addition, temporary culverts may be required at ordinary watercourse crossing points. Table 7 shows methods of watercourse crossing for each watercourse type within WFD water body catchments.

41. There is potential for indirect impacts on the hydrological regime and morphological condition of WFD water bodies due to multiple trenched crossings on ordinary watercourses. Multiple trenched crossings in a WFD water body catchment could alter flow regimes, disrupt coarse sediment transport patterns, and increase the input of fine sediment into water bodies, which could impact morphological conditions. However, as shown in Table 7, there are a low number of trenched crossings required within each WFD water body catchment (2-4), with the exception of Wrabness Brook, where there are

no trenched crossings. It is therefore unlikely that the direct disturbance of surface water bodies will have a significant or permanent impact on the hydrological regime and morphological conditions of any downstream WFD water body.

Table 7 Watercourse crossing methods in water body catchments

Catchment	Sensitivity	Trenchless crossings Main River and Ordinary Watercourses	Trenched crossings Ordinary Watercourses
Holland Brook	High	14	2
Tenpenny Brook	Low	0	2
Wrabness Brook	High	0	0
Coastal catchment	Low	3	4

42. Installation of temporary culverts associated with the haul road could result in the alteration of local bank morphology and potentially increase levels of fine sediment entering water bodies. An increase in fine sediment supply from disturbed ground could cause changes to local geomorphological adjustment rates and therefore impact on any morphological features within channels. Culvert removal following construction could also increase sediment supply into the water body.

43. The maximum possible areas of disturbed ground in each water body receptor are shown in Table 8. Areas of exposed land due to construction activities range from 0.06 to 1.16 km^2, which equate to 0.58% to 1.21% of catchment areas. The higher figure of 1.21% is for Holland Brook, which has the longest section of onshore cable corridor(s) and landfall. Considering the small areas of each catchment that could be disturbed during construction, it is therefore unlikely that increased sediment supply, as a result of disturbed ground, will have a significant or permanent impact on the hydrological regime and morphological conditions of any downstream WFD water body.

Table 8 Areas of disturbed ground in each water body catchment

Catchment	Estimated total area of disturbed ground during construction	
	km	%
Holland Brook	1.16	1.21
Tenpenny Brook	0.27	0.89
Wrabness Brook	0.06	0.58
Coastal catchment	0.36	0.92

4.2.1.2 Construction stage control measures

44. As there are a low number of trenched crossings in each river water body, and small areas of disturbed ground associated with construction activities. Any potential releases of fine sediment originating from the direct disturbance of surface water bodies or exposed land are expected to be localised and

temporary in nature. To mitigate any localised hydromorphological impacts, embedded project control measures will be in place (Table 6 (watercourse crossings, exposed land)).

45. With the implementation of embedded control measures to manage the direct disturbance of surface water bodies and sediment supply, combined with the small scale of direct impacts to each water body, onshore construction activities cannot be considered to cause a deterioration in water body status or the prevention of achieving GEP.

4.2.1.3 Operational activities

46. The increase in impermeable area from the presence of permanent infrastructure and onshore substation will reduce infiltration and potentially alter surface runoff rates and subsurface flows. This could impact upon surface water volumes so that rates of bed and bank erosion may increase and could lead to larger scale geomorphological change.

47. However, as shown in Table 9, areas of permanent (operational) development in each water body catchment are very small (≤0.34%). Given the very small scale of permanent development, and infrequent and highly localised nature of any maintenance work, impacts hydrological regime and morphological conditions are very unlikely.

Table 9 Maximum area of permanent development in each water body catchment

Catchment	Estimated total area permanent development	
	m^2 (km^2)	%
Holland Brook	330,040 (0.33)	0.34
Tenpenny Brook	46,800 (0.047)	0.16
Wrabness Brook	21200 (0.021)	0.20
Coastal catchment	107,910 (0.108)	0.27
Essex gravels	242,040 (0.242)	0.02

4.2.1.4 Operational stage control measures

48. Control measures described in Table 6 for managing sediment supply from exposed land would be in place during any maintenance. Given the limited spatial and temporal scale of operational activity, and with control measures in place, operational activities cannot be considered likely to cause a deterioration in water body status or the prevention of achieving GEP.

4.2.2 Physico-chemistry (general, priority substances)

4.2.2.1 Construction activities

49. Construction activities could result in accidental release of lubricants, oils and runoff into nearby water bodies, impacting upon surface water quality. This could occur accidentally from construction machinery (e.g., fuels and lubricants) and construction materials (e.g., concrete) located near water bodies. Vehicle and construction material storage areas could be an additional source of leaks and spills. Additionally, the presence of welfare facilities may potentially lead to foul water runoff into water bodies.

50. An increase in sediment supply from any disturbed soils along the cable corridor during construction, could increase surface runoff into the water body. Greater fine sediment in the water body could reduce light penetration and affect local oxygenation and temperature conditions.

51. During construction the presence of temporary culverts and use of open cut trenching methods across ordinary watercourses could increase conveyance of pollutants and fine sediment to the downstream WFD water body, impacting on overall dissolved oxygen, pH and temperature.

52. However, as shown in Table 7, there are a low number of multiple trenched crossings required within each WFD water body catchment. Also, as shown in Table 8 and described in Section 4.2.1, areas of disturbed land in each catchment will be small. It is therefore unlikely that the above impacts on ordinary watercourses will have a significant or permanent cumulative physico-chemical impact on any WFD water body,

4.2.2.2 Construction stage control measures

53. To prevent the activities from impacting upon both 'general' and 'priority substances' parameters, the Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors CIRIA (C650) and CIRIA – SuDS Manual (CIRIA, 2015), and other control measures will be applied (see embedded project control measures (Table 6)).

54. Given the limited spatial and temporal scale of construction activity, and with control measures in place, it is unlikely that construction activities will cause a deterioration in water body status or the prevention of achieving GEP.

4.2.2.3 Operational activities

55. Any routine maintenance along the cable corridor and at the onshore substation that is in proximity to the water bodies, has potential to impact upon the physico-chemistry quality elements. This risk is primarily from maintenance vehicles and the potential for lubricants and oils to runoff into the water bodies.

4.2.2.4 Operational stage control measures

56. As shown in Table 9, areas of permanent (operational) development in each water body catchment are very small ($\leq$0.34%). Given the very small scale of permanent development, and infrequent and highly localised nature of any maintenance work, impacts on physico-chemistry are very unlikely. Operational activities cannot be considered likely to cause a deterioration in water body status or the prevention of achieving GEP.

4.2.3 Biological (Aquatic Flora, Benthic Invertebrates, Fish)

4.2.3.1 Construction activities

57. Construction activities could impact on aquatic flora, benthic invertebrates and fish fauna based on potential impacts to the hydromorphology and physico-chemistry quality elements. Increased fine sediment in the water body could smother bed habitats, reducing light penetration and dissolved oxygen. Additionally, changes to physico-chemistry could lead to loss or modification of in-channel and riparian habitats. This disturbance would limit the communities of all three biological parameters.

58. During construction open cut trenching methods across ordinary watercourses could increase conveyance of pollutants and fine sediment to the downstream WFD water bodies, impacting on species and habitat populations.

59. However, as shown in Table 7 there are a low number of multiple trenched crossings required within each WFD water body catchment. Also, as shown in Table 8 and described in Section 4.2.1, areas of disturbed land in each catchment will be small. It is therefore likely that impacts at ordinary watercourses, will not have a significant or permanent cumulative biological impact on any WFD water body.

4.2.3.2 Construction stage control measures

60. Given the proposed control measures that will be implemented to prevent construction impacts to hydromorphology and physico-chemistry (Section 4.2.1, Section 4.2.2, Table 6), these measures will indirectly reduce impacts to biological quality elements, preventing contaminants and fine sediment production from reaching the water bodies and causing risk of deterioration. It is unlikely that construction activities will cause a deterioration in water body status or the prevention of achieving GEP.

4.2.3.3 Operational activities

61. The potential risk of contaminant spills from maintenance vehicles would impact on the hydromorphology and physico-chemistry of the water bodies which will ultimately impact upon the supporting biological communities of aquatic flora, benthic invertebrates and fish fauna.

4.2.3.4 Operational stage control measures

62. Given the proposed control measures that will be implemented to prevent operational impacts to hydromorphology and physico-chemistry (Section 4.2.1, Section 4.2.2, Table 6), these measures will indirectly reduce impacts to biological quality elements, preventing contaminants and fine sediment production from reaching the water bodies and causing risk of deterioration. It is unlikely that construction activities will cause a deterioration in water body status or the prevention of achieving GEP.

4.3 Groundwater bodies

4.3.1 Groundwater quality (GWDTEs, Deterioration in Water Quality, Increasing pollution concentrations)

4.3.1.1 Construction activities

63. There is a risk that excavations to facilitate trenchless crossings could potentially introduce contaminants to the groundwater body. Accidental release of lubricants, fuels and oils from construction machinery could occur due to spillages, leakage from vehicle storage areas, and direct release from construction machinery working directly in or adjacent to water bodies. If not prevented, these contaminants could enter connected groundwaters through run-off. An increase in groundwater contaminant concentrations could subsequently lead to an overall deterioration in groundwater quality. These contaminants could then be transferred to GWDTEs via subsurface flow routes.

4.3.1.2 Construction stage control measures

64. As assessed in Chapter 21 of the PEIR (Volume I), a very small proportion of the groundwater body (0.2%) could be directly affected by construction activities for the landfall, onshore cable corridor(s) and onshore substation. Across entire groundwater catchment, these activities would not lead to significant changes in groundwater drainage or flood risk. Magnitude of impact and significance of effect have been assessed as negligible and minor.

65. Given the small scale of construction work in the groundwater body catchment, and with embedded mitigation (Table 6 (supply of contaminants, groundwater quality and abstractions for public water supply)) in place, the Project is very unlikely to cause a deterioration in water body status or prevent it achieving a Good overall status.

4.3.1.3 Operational activities

66. Operational activities at the landfall, along the onshore cable corridor(s) and at the onshore substation may include planned and unplanned maintenance. Contaminants may leak into surface waters during operation through surface runoff or accidental spillage or leakage of fuel oils or lubricants from vehicles, which could impact upon surface water quality and that of connected groundwaters (including aquifers which support potable water supplies (i.e., area of the Principal aquifer near Beaumont). This could have subsequent impacts upon aquatic ecology and the use of water resources for licensed and unlicensed abstractions.

4.3.1.4 Operational control measures

67. As assessed in Chapter 21 of the PEIR (Volume I), a very small proportion of the groundwater body (0.24 km^2 (0.02%)) could contain permanent infrastructure. Given the small scale of construction work in the groundwater body catchment, and with embedded mitigation (Table 6 (supply of contaminants, groundwater quality and abstractions for public water supply)) in place, the Project is very unlikely to cause a deterioration in water body status or prevent it achieving a Good overall status.

5 Stage 4: Summary of Assessment and Mitigation Requirements

68. Results of the preliminary WFD compliance assessment process are summarised in Table 10.

Table 10 Summary of WFD Compliance Assessment

Water body	Stage 2	Stage 3	Deterioration in status	Prevent objectives being achieved
Holland Brook	✓	✓	×	×
Tenpenny Brook	✓	✓	×	×
Wrabness Brook	✓	✓	×	×
Essex	✓	×	×	×
Hamford Water	×	×	×	×
Essex Gravels	✓	✓	×	×

69. The implementation of outlined control measures during construction and operation phases means there will be no activities that have the potential to cause non-temporary effects (i.e., effects that are not permanent, but could last for the duration or beyond the current River Basin Planning Cycle) to the status of any of the river and groundwater bodies assessed. Construction and operation will also not prevent water body status objectives being achieved in the future. The Project is therefore considered to be compliant with WFD requirements.

70. For decommissioning, it is anticipated that for the purposes of a worst case scenario, the impacts will be no greater than those identified for the construction phase (See Section 2.4). Detailed compliance assessment results (Section 4) and overall conclusions would be the same for decommissioning as for construction and operation – the Project would be compliant with WFD requirements.

6 References

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Annex 21.2.1: WFD protected areas associated with each water body

Water body/protected area	ID	Directive
Holland Brook		
Sandlings and Chelmsford	G78	Nitrates Directive
Holland Brook NVZ	S438	Nitrates Directive
Tenpenny Brook		
Sandlings and Chelmsford	G78	Nitrates Directive
Colne Estuary (Mid-Essex Coast Phase 2)	UK9009243	Conservation of Wild Birds Directive
Tenpenny Brook NVZ	S435	Nitrates Directive
Wrabness Brook		
Sandlings and Chelmsford	G78	Nitrates Directive
Stour And Orwell Estuaries	UK9009121	Conservation of Wild Birds Directive
Ramsey River NVZ	S421	Nitrates Directive
Essex		
Colne Estuary (Mid-Essex Coast Phase 2)	UK9009243	Conservation of Wild Birds Directive
Essex Estuaries	UK0013690	Habitats and Species Directive
Dengie (Mid-Essex Coast Phase 1)	UK9009242	Conservation of Wild Birds Directive
Outer Thames Estuary	UK9020309	Conservation of Wild Birds Directive
Outer Thames	UKSW24	Shellfish Water Directive
Foulness	UKSW22	Shellfish Water Directive
Hamford Water	UK9009131	Conservation of Wild Birds Directive
Dengie	UKSW18	Shellfish Water Directive
Frinton	UK11300	Bathing Water Directive
Colne_E	UKSW17	Shellfish Water Directive
Clacton	UK11500	Bathing Water Directive
Walton	UK11250	Bathing Water Directive
Foulness (Mid-Essex Coast Phase 5)	UK9009246	Conservation of Wild Birds Directive
Roach and Lower Crouch	UKSW20	Shellfish Water Directive
Felixstowe South	UK11000	Bathing Water Directive
Clacton Beach Martello Tower	UK11650	Bathing Water Directive
Felixstowe North	UK10900	Bathing Water Directive
Holland	UK11350	Bathing Water Directive
Jaywick	UK11600	Bathing Water Directive
Margate And Long Sands	UK0030371	Habitats and Species Directive
Hamford Water		
Walton Backwaters	UKSW10	Shellfish Water Directive

Water body/protected area	ID	Directive
Hamford Water	UK9009131	Conservation of Wild Birds Directive
Essex Gravels		
Crouch NVZ	S425	Nitrates Directive
Sandlings and Chelmsford	G78	Nitrates Directive
River Blackwater NVZ	S434	Nitrates Directive
River Roach, Nobles Ditch and Eastwood Brook NVZ	S427	Nitrates Directive
Virley Brook	S430	Nitrates Directive
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
Tenpenny Brook NVZ	S435	Nitrates Directive
Lower Stour NVZ	S662	Nitrates Directive
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
Layer Brook NVZ	S431	Nitrates Directive
Spickets Brook NVZ	S429	Nitrates Directive
Stutton Brook NVZ	S423	Nitrates Directive
Holbrook NVZ	S422	Nitrates Directive
Holland Brook NVZ	S438	Nitrates Directive
Essex Gravels	UKGB40503G000400	Drinking Water Protected Area
Roman River NVZ	S433	Nitrates Directive
Belstead Brook NVZ	S410	Nitrates Directive
Roman River NVZ	S432	Nitrates Directive