NORTH FALLS

Offshore Wind Farm

ENVIRONMENTAL STATEMENT

Appendix 21.2 Water Environment Regulations Compliance Assessment

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Glossary of Acronyms

AEoI	Adverse Effect on Integrity
CIRIA	Construction Industry Research and Information Association
CoCP	Code of Construction Practice
DWPA	Drinking Water Protected Area
EIA	Environmental Impact Assessment
EQSD	Environmental Quality Standards Directive
ES	Environmental Statement
EU	European Union
Five Estuaries	Five Estuaries Offshore Wind Farm
GEP	Good Ecological Potential
GES	Good Ecological Status
GGOW	Greater Gabbard Offshore Wind Farm
GWDTE	Groundwater Dependent Terrestrial Ecosystems
HDD	Horizontal Directional Drilling
HMWB	Heavily Modified Water Body
HRA	Habitats Regulations Assessment
INNS	Invasive Non Native Species
NVZ	Nitrate Vulnerable Zone
OCoCP	Outline Code of Construction Practice
PBDE	Polybrominated Diphenyl Ethers
PEMP	Project Environmental Management Plan
PPG	Pollution Prevention Guidance
RBMP	River Basin Management Plan
RIAA	Report to Inform Appropriate Assessment
SAC	Special Area of Conservation
SMP	Soil Management Plan
SoS	Secretary of State
SPA	Special Protected Area
SSC	Suspended Sediment Concentration
WER	Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (as amended)
WFD	Water Framework Directive

Glossary of Terminology

Array area	The offshore wind farm area, within which the wind turbine generators, array cables, platform interconnector cable, offshore substation platform(s) and/or offshore converter platform will be located.
Array cables	Cables which link the wind turbine generators with each other, the offshore substation platform(s) and/or the offshore converter platform.
Aquifer	Geological strata that hold water.
Bailey Bridge	A type of portable, pre-fabricated, truss bridge.
Coastal catchment	Land which drains 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.
Horizontal directional drill (HDD)	Trenchless technique to bring the offshore cables ashore at the landfall. The technique will also be used for installation of the onshore export cables at sensitive areas of the onshore cable route.
Landfall	The location where the offshore export cables come ashore at Kirby Brook.
Landfall compound	Compound at landfall within which horizontal directional drill (HDD) or other trenchless technique would take place.
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 project area	The overall area of the array area and the offshore cable corridor.
Offshore cable corridor	The corridor of seabed from the array area to the landfall within which the offshore export cables will be located.
Offshore converter platform	Should an offshore connection to a third party High Voltage Direct Current (HVDC) cable be selected, an offshore converter platform would be required. This is a fixed structure located within the array area, containing HVAC and HVDC electrical equipment to aggregate the power from the wind turbine generators, increase the voltage to a more suitable level for export and convert the HVAC power generated by the wind turbine generators into HVDC power for export to shore via a third party HVDC cable.
Offshore export cables	The cables which bring electricity from the offshore substation platform(s) to the landfall, as well as auxiliary cables.
Offshore substation platform(s)	Fixed structure(s) located within the array area, containing HVAC electrical equipment to aggregate the power from the wind turbine generators and increase the voltage to a more suitable level for export to shore via offshore export cables.
Onshore cable route	Onshore route within which the onshore export cables and associated infrastructure would be located.
Onshore project area	The boundary within which all onshore infrastructure required for the Project will be located (i.e. landfall; onshore cable route, accesses, construction compounds; onshore substation and cables to the National Grid substation).
Onshore substation	A compound containing electrical equipment required to transform and stabilise electricity generated by the Project so that it can be connected to the National Grid.
Onshore substation construction compound	Area set aside to facilitate construction of the onshore substation. Will be located adjacent to the onshore substation.
Onshore substation works area	Area within which all temporary and permanent works associated within the onshore substation are located, including onshore substation, construction compound, access, landscaping, drainage and earthworks.
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.

Platform interconnector cable	Cable connecting the offshore substation platforms (OSP) or the OSP and offshore converter platform (OCP).
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.
The Applicant	North Falls Offshore Wind Farm Limited (NFOW).
The Project Or 'North Falls'	North Falls Offshore Wind Farm, including all onshore and offshore infrastructure.
Wind turbine generator	Power generating device that is driven by the kinetic energy of the wind.

1 Introduction

1.1 Project background

1. North Falls Offshore Wind Farm Ltd (NFOW) ('the Applicant') has submitted a Development Consent Order (DCO) application for the North Falls Offshore Wind Farm (hereafter 'North Falls').
2. North Falls is a Nationally Significant Infrastructure Project, located in the southern North Sea, c. 40km from the East Anglian coast, and is an extension to the west of the existing Greater Gabbard Offshore Wind Farm.
3. North Falls would make an important contribution to United Kingdom (UK) policies and targets through the generation of clean, low carbon, renewable electricity (see Chapter 2 Need for the Project (Document Reference: 3.1.4)).
4. Development and worst case scenarios relevant to this assessment are described in Section 1.3, these relate to the nearshore offshore export cables and onshore project area.
5. The offshore cable corridor runs from the array area to the landfall area at Kirby Brook, Essex, routing around various constraints discussed further in Chapter 4 Site Selection and Assessment of Alternatives (Document Reference: 3.1.6).
6. Onshore export cables will then transport the electricity to the onshore substation located near Ardleigh within the Tendring district of Essex, before it enters the national grid. The offshore and onshore project locations are shown in Figures 1.1 and 1.2 (3.2.1), respectively. Details of the Project Design Envelope are provided in Chapter 5 Project Description (Document Reference: 3.1.7).

1.2 Legislative context

7. 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 (WFD)) (England and Wales) Regulations 2017 (as amended) (herein the 'WER'). The WER continue to enforce 'Directive 2000/60/EC of the European Parliament and of the Council of 23rd October 2000 establishing a framework for community action in the field of water policy'. They remain in force following the UK's withdrawal from the European Union (EU) under the terms of the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019.
8. The WER assign responsibility to the Secretary of State (SoS) and the Environment Agency to secure compliance with the WFD in England by exercising their 'relevant functions'.
9. There are two separate components used to classify the status of surface water bodies (rivers, lakes, estuaries and coastal waters); ecological and chemical. The ecological status of a surface water body is assessed according to the condition of:
    - Biological quality elements, including fish, benthic invertebrates and aquatic flora;

- Physico-chemical quality elements, including thermal conditions, salinity, pH, nutrient concentrations and concentrations of specific pollutants such as copper; and
- Hydromorphological quality elements, including morphological conditions, hydrological regime and tidal regime.

10. The ecological status of surface waters is recorded on a scale of 'high', 'good', 'moderate', 'poor' and 'bad'. The ecological status of a water body is determined by the worst scoring quality element, which means that the condition of a single quality element can cause a water body to fail to reach its classification objectives. The overall environmental objective of reaching Good Ecological Status (GES) applies to these water bodies.

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

12. The chemical status of surface waters is assessed by compliance with environmental standards that are listed in the Environmental Quality Standards Directive (2008/105/EC). These chemicals include priority substances and priority hazardous substances. Chemical status is recorded as either 'good' or 'fail' and is determined by the lowest scoring chemical.

1.3 Development and worst-case scenarios

13. The development scenarios for North Falls are described in detail in Environmental Statement (ES) Chapter 5 Project Description (Document Reference: 3.1.7). The Project includes the following grid connection options:

- Option 1: Onshore electrical connection at a national grid connection point within the Tendring Peninsula of Essex, with a project alone onshore cable route and onshore substation infrastructure.
- Option 2: Onshore electrical connection at a national grid connection point within the Tendring peninsula of Essex, sharing an onshore cable route and onshore duct installation (but with separate onshore export cables) and co-locating separate project onshore substation infrastructure with Five Estuaries Offshore Wind Farm (Five Estuaries).
- Option 3: Offshore electrical connection, supplied by a third-party.

14. For onshore works under option 2, North Falls infrastructure required is the same as for option 1, with the addition of North Falls installing cable ducts for the second project (realistic worst case scenario as outlined in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23)). However, certain activities that are common to both North Falls and Five Estuaries can be optimised and shared. This includes sharing aspects such as the accesses and haul road and temporary construction compounds along the onshore cable route, preventing unnecessary duplication of similar infrastructure or removal of items that could be used by a second project constructing sequentially with the first.

15. This is considered to be the worst case for impacts on water bodies because temporary crossings to allow the haul road to continue (e.g. culverts) would remain in place and directly disturbing watercourses.

16. As assessed in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23) the worst-case scenario for cumulative effects with Five Estuaries is Scenario 3 (see Chapter 5 Project Description (Document Reference: 3.1.7) for further details of North Falls and Five Estuaries' cumulative build-out scenarios):

- **Scenario 3** – Five Estuaries does not proceed to construction; or both Five Estuaries and North Falls projects proceed to construction on significantly different programmes (over 3 years apart). In the latter case the significantly different programmes would mean that haul roads and temporary construction compounds (TCCs) are reinstated prior to the second project proceeding. In such case cumulative impacts are for a potential construction period of 6 years+. This scenario presents no reduction in overall impacts for the projects from the sharing of infrastructure.

17. Cumulative effects with Five Estuaries have been assessed as no worse than for North Falls in ES Chapter 21 Water Resources and Flood Risk (Section 21.8) (Document Reference: 3.1.23) and are not considered further in this assessment.

18. For offshore activities, as described in Chapter 8 Geology, Oceanography and Physical Processes (Document Reference: 3.1.10), options 1 and 2 would be the same, and these represent the worst-case scenario (for option 3 there would be no project offshore export cables).

19. The assessment for offshore cumulative effects assessed in Chapter 8 Geology, Oceanography and Physical Processes (Document Reference: 3.1.10) states that given the local nature of impacts, the overall cumulative effect significance is predicted to be negligible adverse (not significant). Cumulative offshore effects are not considered further in this assessment.

1.3.1 Description of activities

20. A detailed description of The Project can be found in Chapter 5 Project Description (Document Reference: 3.1.7) and summarised below:

- Construction: Offshore project area:
  - Offshore cable corridor installation. In line with guidance (Environment Agency, 2023) activities in the marine environment are usually assessed up to one nautical mile out to sea, and 12 nautical miles for chemical status. However, due to the unusual shape of the Essex coastal water body, which extends up to 6.1 nautical miles along the offshore cable corridor, the full extent of the water body crossed by the offshore project has been considered. Buried offshore cables will be installed by ploughing, jetting, or trenching. Sand wave levelling along the offshore cable corridor may be required (up to 24m width). Detailed descriptions of these methods are provided in Chapter 5 Project description (Document Reference: 3.1.7).

- Offshore construction also includes the subtidal Horizontal Directional Drilling (HDD) exit pit. A commitment has been made to install the export cables at the landfall using trenchless techniques, thus avoiding direct disturbance in the intertidal zone. The HDD exit location would be up to 1.5km (0.81 nautical miles) from shore. No cable protection would be required in this area.

- Operation: Offshore project area:
  - 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).
  - 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, reburial and periodic inspection may be required.
- Construction: Onshore project area:
  - Landfall. Installation by HDD would require a fenced landfall compound. A maximum 150 x 75m temporary landfall compound for up to four transition joint bays may be required. The offshore export cables and the onshore cables would be jointed within transition joint bays located at the landfall compound.
  - Onshore cable route. The primary cable installation method would be open cut trenching, with cable ducts installed within the trench(es) and surrounded with suitably engineered soil before backfilling with selected excavated soil. Cables would then be pulled through the pre-laid ducts at a later stage in the construction programme. Where it has not been possible for the onshore cable route to avoid crossing constraints such as transport routes (road and rail) or watercourses, then alternative trenchless crossing methodologies will be required, such as HDD.
    - As a worst case it is assumed a haul road will be required along the full length of the onshore cable route. The haul road will be 6m wide (up to 10m at passing locations, located at approximately 500m intervals) with drainage either side. The haul road will cross watercourses using culverts or Bailey bridges (these will not be used on Main Rivers).
  - Onshore substation. A new construction access and onshore substation temporary construction compound will be created in advance of construction. The main activities at the onshore substation will include:
    - Topsoil strip and grading of ground levels.
    - After grading, excavations would then proceed with the laying of foundations, trenches, and drainage. At this stage it is not

known whether the foundations would be ground bearing or piled. Following the completion of any cut and fill exercise and installation of drainage and foundations, the substation platform would be finished with a layer of imported stone fill combined with a concrete pour.

- National Grid substation connection works. In a worst case scenario, the 400kV cables from the onshore substation to the national grid connection point would be installed by open cut trenching (although the option to use trenchless techniques remain). This method will require a trench to be excavated between the onshore substation and the grid connection for the cables to be laid directly and jointed before being installed.

- Operation: Onshore project area:
  - Onshore export cables. Access to the onshore export cables to conduct emergency repairs may be required. In the event of a cable failure the affected stretch of cable (500 to 1,000m section) would be pulled out of the duct and replaced. To do this the joint bays, which are below ground at either end of that stretch of cable, would be exposed to get access to those bays, and then backfilled after the works are complete. This activity would be highly localised and may not be required during the operational life of the cable infrastructure.
  - Electrical equipment at the onshore substation will be maintained throughout the life of the Project as necessary.

2 Assessment methodology

21. A detailed published methodology for undertaking assessment for compliance with the WER across all types of water bodies is not available. However, the following relevant guidance and case law exists to support the assessment of various water body types:

- 'Advice Note 18' (Planning Inspectorate, 2017): This advice note provides an overview of the WFD and provides an outline methodology for considering the WFD as part of the Development Consent Order Process.
- 'Clearing the waters for all' (Environment Agency, 2023): Outlines a methodology for assessing impacts on transitional and coastal water bodies.
- 'WFD risk assessment' (Environment Agency, 2016a): This provides information on how to assess the risk of a proposed activity, as well as guidance for proposed developments planning to undertake activities that would require a flood risk activity permit.
- 'Protecting and improving the water environment' (Environment Agency, 2016b): Provides guidance on the WFD compliance of physical works and other activities in river water bodies.

- EUECJ C-461-13. Bund für Umwelt und Naturshutz Deutschland eV v Bundesrepublik Deutschland (ECJ, 2015). This case confirms the detail around determining a deterioration in the status of a water body.

22. 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 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

23. This stage consists of an initial screening exercise to identify relevant water bodies in the onshore and offshore project areas. Water bodies are selected for inclusion in the early stages of the compliance assessment using the following criteria, with reference to the Anglian River Basin District Management Plan (RBMP), as presented in the online Catchment Data Explorer (Environment Agency, 2022a):

- 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

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

25. Water bodies and activities can be scoped out of further assessment if it can be satisfactorily demonstrated that there would be no impacts. The water body and activity under assessment would be progressed to the detailed compliance assessment (Stage 3) if potential impacts on quality elements cannot be ruled out.

2.3 Stage 3: Detailed Compliance Assessment

26. If appropriate, a Stage 3 compliance assessment would consider whether any activities that have been carried forward from Stage 2 would cause deterioration, and whether any such deterioration would have a significant effect on the status of one or more quality elements at water body level.

27. Potential measures to avoid effects or achieve reasonable improvements would be investigated if it is established that:

- The Projects are likely to affect status at water body level (that is, by causing deterioration in status or by preventing achievement of objectives and the implementation of mitigation measures for AHMWBs);
- An opportunity may exist to contribute to improving status at a water body level.

28. Where applicable, this stage considers such measures and, where necessary, evaluates them in terms of cost and proportionality in relation to the scale of the proposed activity and the nature of any impacts.

2.4 Approach to decommissioning

29. The scope of decommissioning works would be determined by the relevant legislation and guidance at the time of decommissioning. The decommissioning works would be subject to further environmental assessment and licencing towards the end of the Project life.

2.4.1 Offshore decommissioning

30. Offshore decommissioning is likely to include removal of all of the wind turbine components, and part of the foundations (those above seabed level). Cables, cable protection and scour protection may be left in situ. The timescale for decommissioning works is estimated to be approximately 3 years.

31. As an alternative to decommissioning, the owners may wish to consider re-powering the wind farm. Should the owners choose to pursue this option, this is likely to be subject to a new application for consent.

2.4.2 Onshore decommissioning

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

33. It is anticipated that for the purposes of a worst case scenario, decommissioning impacts will be no greater than those identified for the construction phase:

- The same water bodies screened into the assessment for construction and operation (Section 3) 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.

2.5 Determination of deterioration

34. 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 would also be considered against the water body objectives to ensure the achievement of status objectives (i.e., GES or GEP) would not be prevented.

2.5.1 Article 4.7 of the Water Framework Directive

35. 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.

36. 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. If a derogation application is necessary, consultation with the Environment Agency would be required to determine the scope of any assessment to demonstrate compliance with the requirements of Article 4.7.

3 Stage 1: Screening

3.1 Identification of water bodies

37. River, coastal and groundwater water bodies that could potentially be affected by the Project are listed in Table 3.1 and shown in Figures 21.1 and 21.2 (3.2.17). Water bodies have been screened into the assessment in response to the proposed works being close to and/or hydrologically connected to water bodies.

38. Cycle 2 (2019) chemical status is shown as parameters have not been assessed in Cycle 3 (2022). This is because all water bodies in England are at Fail for chemical status due to a range of global pollutants for which there is currently no known technical solution (e.g. mercury compounds, perfluorooctane sulphonate (PFOS) and polybrominated diphenyl ethers (PBDE)). The timescale objective for reaching Good status reflects the natural recovery time for these chemicals.

Table 3.1 Water bodies screened into the assessment

Water Body Name	Water Body Type	Description[1]	Screened In/Out	Reason for screening decision
Holland Brook (GB105037077810)	River	Heavily modified water body at Moderate ecological potential. Significant water quality pressures are shown by a Poor classification for some biological and physico-chemical quality elements (fish, invertebrates (macrophytes sub element and phosphate)). The water body is also classified as Moderate or less for mitigation measures assessment. Chemical status is Fail due to high levels of priority hazardous substances (polybrominated diphenyl ethers (PBDE), mercury and its compounds). The reasons for not achieving good (RNAG) status for the water body include diffuse pollution associated with poor livestock, nutrient and soil management, and urban development. There are also issues associated with point source pollution (sewage), physical modifications (barriers and land drainage), as well as saline intrusion and fish stocking.	In	The onshore substation, onshore cable route and landfall will be located within this water body.
Tenpenny Brook (GB105037041310)	River	Heavily modified water body at Moderate ecological potential. Significant water quality pressures are shown by a Poor classification for biological quality elements (fish) and a Bad classification for phosphate (physico-chemical quality).	In	The onshore substation and onshore cable route will be located within this water body.

[1] Water body descriptions in this column are taken from the Environment Agency's Catchment Data Explorer (https://environment.data.gov.uk/catchment-planning/).

Water Body Name	Water Body Type	Description[1]	Screened In/Out	Reason for screening decision
		The water body is at Fail for chemical status due to high levels of priority hazardous substances (mercury and its compounds and PBDE). RNAG include point source pollution from sewage and physical modifications (barriers and flood protection structures).		
Wrabness Brook (GB105036040800)	River	Heavily modified water body at Good ecological potential, although the water body does not support a good hydrological regime. The water body is at Fail for chemical status due to high levels of priority hazardous substances (mercury and its compounds and PBDE). Although at Good ecological potential, there are water quality issues associated with diffuse pollution (poor livestock and nutrient management), point source pollution (private sewage treatment) and flow (surface water abstraction).	In	The onshore cable route will be located within this water body.
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	The offshore cable route, including cable protection, will be located within this water body.

Water Body Name	Water Body Type	Description[1]	Screened In/Out	Reason for screening decision
		RNAG are related to physical modifications.		
Hamford Water (GB680503713700)	Coastal	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). RNAG are uncertain (pending investigation by the Environment Agency).	In	The onshore project area is approximately 800-900m upstream of the water body at its closest. Although there will be no construction in Hamford Water, the upstream coastal catchment, which drains to Hamford Water, will be crossed by the onshore cable route. Hamford Water has several associated designated sites (Hamford Water Special Area of Conservation (SAC), Special Protected Areas (SPA) and Ramsar).
Essex Gravels (GB40503G000400)	Groundwater	The groundwater body is at Poor overall status. It has Good quantitative status but Poor chemical status. RNAG are related to diffuse pollution (poor livestock and nutrient management).	In	All components of the onshore project (onshore substation, onshore cable route, landfall) will overlie this groundwater body.

3.2 Scoping

39. 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 compliance assessment (Table 3.2). This assessment therefore determines the scope for any future detailed compliance assessment (Stage 3) which may be required for the Project.

40. Potential impacts of the Project on quality elements for river, coastal and groundwater bodies are presented in Sections 3.2.1, and 3.2.3. Section 3.3 evaluates impacts on improvement and mitigation measures set out in the RBMP (Environment Agency, 2022), and Section 3.4 discusses protected areas that could be affected by the Project. Section 3.5 provides a summary of Stage 2 scoping.

41. 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 (Section 1.3).

3.2.1 River water bodies

Table 3.2 Scoping assessment for river water bodies

Parameter	Scoping question	Scoping assessment	Scoping decision
Water bodies assessed: Holland Brook (GB105037077810), Tenpenny Brook (GB105037041310), Wrabness Brook (GB105036040800)			
Project components assessed: Onshore project area: landfall, onshore cable route (including construction accesses and temporary construction compounds (TCCs)), onshore substation and National Grid substation connection works.			
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 Construction activities, including cable trenching (open-cut and trenchless techniques), use of a temporary haul road and temporary watercourse crossings, and construction of the onshore substation, could increase the amount of fine sediment supplied to 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. It should be noted that the onshore project area only just crosses into Wrabness Brook's catchment (the area of onshore cable route in this catchment is approximately 0.01km^2 (1 ha) (0.09%). The potential for impacts would be very limited to a small area near Horsley Cross.	In
		Operation The area of each river catchment occupied by permanent infrastructure that could require maintenance work is very small, with a maximum of 0.198km^2 (0.21%) of the catchment of Holland Brook. Areas of permanent infrastructure equate to very small proportions of each catchment, reaching a maximum of 0.32% in the catchment of Tenpenny Brook. Reinstatement and removal of the haul road during operation would result in disturbance of approximately 0.013km^2 of Tenpenny Brook's catchment (0.04% of the catchment area) and 0.010km^2 of Holland Brook's catchment (0.03% of the catchment area). There could be some very minor	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		impacts on geomorphology associated with one temporary watercourse crossing, which would be managed through industry good practice measures. Only a very small area of Wrabness Brook's catchment could contain permanent infrastructure (60m^2; 0.06%). If the final position of the onshore export cables is towards the centre of west/south-west of the onshore cable route, there may not be any permanent infrastructure in this catchment. In a worst case there could be some routine maintenance required throughout the operational life of the Project. As assessed in Environmental Statement (ES) Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23), the magnitude of impact for operational activities associated with the accidental release of contaminants (including fine sediment) to surface and groundwater, and changes to surface and groundwater flows and flood risk in all catchments is negligible. Significance of effect for all catchments is either negligible or minor adverse depending on catchment sensitivity. Due to the very small area of each catchment that could be affected by operational activities, changes to hydromorphology and/or physico-chemistry are not anticipated.	
	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 bodies originating from construction activities 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. It should be noted that the onshore project area only just crosses into Wrabness Brook's catchment (the area of onshore cable route in this catchment is approximately 0.01km^2 (1 ha) (0.09%). The potential for impacts would be very limited to a small area near Horsley Cross.	In

Parameter	Scoping question	Scoping assessment	Scoping decision
		Operation The area of each river catchment occupied by permanent infrastructure that could require maintenance work is very small, with a maximum of 0.196km^2 (0.20%) of the catchment of Holland Brook. Areas of permanent infrastructure equate to very small proportions of each catchment, reaching a maximum of 0.32% in the catchment of Tenpenny Brook. Reinstatement and removal of the haul road during operation would result in disturbance of approximately 0.013km^2 of Tenpenny Brook's catchment (0.04% of the catchment area) and 0.010km^2 of Holland Brook's catchment (0.03% of the catchment area). There could be some very minor impacts on geomorphology associated with one temporary watercourse crossing, which would be managed through industry good practice measures. Only a very small area of Wrabness Brook's catchment could contain permanent infrastructure (60m^2; 0.06%). If the final position of the onshore export cables is towards the centre of west/south-west of the onshore cable route, there may not be any permanent infrastructure in this catchment. In a worst case there could be some routine maintenance required throughout the operational life of the Project As assessed in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23), the magnitude of impact for operational activities associated with the accidental release of contaminants (including fine sediment) to surface and groundwater, and changes to surface and groundwater flows and flood risk in all catchments is negligible. Significance of effect for all catchments is either negligible or minor adverse depending on catchment sensitivity. Due to the very small area of each catchment that could be affected by operational activities, the loss or modification of habitats for aquatic invertebrates is not anticipated.	Out
	Could the activity change the hydromorphology and/or physico-chemistry of the water body, or	Construction 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	In

Parameter	Scoping question	Scoping assessment	Scoping decision
	lead to the direct loss or modification of shelter, feeding and spawning habitats for fish?	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. It should be noted that the onshore project area only just crosses into Wrabness Brook's catchment (the area of onshore cable route in this catchment is approximately 0.01km^2 (1 ha) (0.09%). The potential for impacts would be very limited to a small area near Horsley Cross.	
		Operation The area of each river catchment occupied by permanent infrastructure that could require maintenance work is very small, with a maximum of 0.198km^2 (0.21%) of the catchment of Holland Brook. Areas of permanent infrastructure equate to very small proportions of each catchment, reaching a maximum of 0.32% in the catchment of Tenpenny Brook. Reinstatement and removal of the haul road during operation would result in disturbance of approximately 0.013km^2 of Tenpenny Brook's catchment (0.04% of the catchment area) and 0.010km^2 of Holland Brook's catchment (0.03% of the catchment area). If a temporary crossing is required, it will be set to allow fish passage (although the crossing is located on a very minor field drain). Only a very small area of Wrabness Brook's catchment could contain permanent infrastructure (60m^2; 0.06%). If the final position of the onshore export cables is towards the centre of west/south-west of the onshore cable route, there may not be any permanent infrastructure in this catchment. In a worst case there could be some routine maintenance required throughout the operational life of the Project. As assessed in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23), the magnitude of impact for operational activities associated with the accidental release of contaminants (including fine sediment) to surface and groundwater, and changes to	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		surface and groundwater flows and flood risk in all catchments is negligible. Significance of effect for all catchments is either negligible or minor adverse depending on catchment sensitivity. Due to the very small area of each catchment that could be affected by operational activities, the loss or modification of shelter, feeding and spawning habitats for fish is not anticipated.	
Hydromorphology	Could the activity change the volume, energy or distribution of flows in the water body?	Construction Ground disturbance caused by construction activities and changes to land use and soil properties 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. It should be noted that the onshore project area only just crosses into Wrabness Brook's catchment (the area of onshore cable route in this catchment is approximately 0.01km^2 (1 ha) (0.09%). The potential for impacts would be very limited to a small area near Horsley Cross.	In
		Operation The area of each river catchment occupied by permanent infrastructure that could require maintenance work is very small, with a maximum of 0.198km^2 (0.21%) of the catchment of Holland Brook. Areas of permanent infrastructure equate to very small proportions of each catchment, reaching a maximum of 0.32% in the catchment of Tenpenny Brook. Reinstatement and removal of the haul road during operation would result in disturbance of approximately 0.013km^2 of Tenpenny Brook's catchment (0.04% of the catchment area) and 0.010 km^2 of Holland Brook's catchment (0.03% of the catchment area). Work associated with the haul road would be so localised that impacts on flows are not expected.	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		Only a very small area of Wrabness Brook's catchment could contain permanent infrastructure (60m^2; 0.06%). If the final position of the onshore export cables is towards the centre of west/south-west of the onshore cable route, there may not be any permanent infrastructure in this catchment. In a worst case there could be some routine maintenance required throughout the operational life of the Project. As assessed in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23), the magnitude of impact for operational activities associated with changes to surface and groundwater flows and flood risk in all catchments is negligible. Significance of effect for all catchments is either negligible or minor adverse depending on catchment sensitivity. Due to the very small area of each catchment that could be affected by operational activities, changes in the volume, energy or distribution of flows are not anticipated.	
	Could the activity change the width, depth, bank conditions, bed substrates and structure of the riparian zone?	Construction Ground disturbance caused by construction activities is likely to increase fine sediment supply to water bodies, which could have impacts on hydromorphology. Temporary culverts at haul road crossing points would change the channel bed and bank conditions. Any increase in surface runoff has the potential to increase scour to the bed and banks and structure of the riparian zone. It should be noted that the onshore project area only just crosses into Wrabness Brook's catchment (the area of onshore cable route in this catchment is approximately 0.01km^2 (1 ha) (0.09%). The potential for impacts would be very limited to a small area near Horsley Cross.	In
		Operation	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		The area of each river catchment occupied by permanent infrastructure that could require maintenance work is very small, with a maximum of 0.198km^2 (0.21%) of the catchment of Holland Brook. Areas of permanent infrastructure equate to very small proportions of each catchment, reaching a maximum of 0.32% in the catchment of Tenpenny Brook. Reinstatement and removal of the haul road during operation would result in disturbance of approximately 0.013km^2 of Tenpenny Brook's catchment (0.04% of the catchment area) and 0.010km^2 of Holland Brook's catchment (0.03% of the catchment area). There is limited potential for changes to bed, bank and riparian conditions once the Project is operational. There may be highly localised and temporary impacts associated with one temporary watercourse crossing. If a crossing is required, the culvert would be set to allow bedload transport and bed and banks would be sympathetically reinstated. Only a very small area of Wrabness Brook's catchment could contain permanent infrastructure (60m^2; 0.06%). If the final position of the onshore export cables is towards the centre of west/south-west of the onshore cable route, there may not be any permanent infrastructure in this catchment. In a worst case there could be some routine maintenance required throughout the operational life of the Project. As assessed in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23), the magnitude of impact for operational activities associated with the supply of contaminants (including fine sediment) and changes to surface and groundwater flows and flood risk in all catchments is negligible. Significance of effect for all catchments is either negligible or minor adverse depending on catchment sensitivity. Due to the very small area of each catchment that could be affected by operational activities, changes the width, depth, bank conditions, bed substrates and structure of the riparian zone not anticipated.	

Parameter	Scoping question	Scoping assessment	Scoping decision
	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 be buried at watercourse crossings and 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. It should be noted that the onshore project area only just crosses into Wrabness Brook's catchment (the area of onshore cable route in this catchment is approximately 0.01km^2 (1 ha) (0.09%). The potential for impacts would be very limited to a small area near Horsley Cross.	In
		Operation The area of each river catchment occupied by permanent infrastructure that could require maintenance work is very small, with a maximum of 0.198km^2 (0.21%) of the catchment of Holland Brook. Areas of permanent infrastructure equate to very small proportions of each catchment, reaching a maximum of 0.32% in the catchment of Tenpenny Brook. Reinstatement and removal of the haul road during operation would result in disturbance of approximately 0.013km^2 of Tenpenny Brook's catchment (0.04% of the catchment area) and 0.010 km^2 of Holland Brook's catchment (0.03% of the catchment area). Any impacts on water quality from haul road activities would be highly localised and impacts are not anticipated.	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		Only a very small area of Wrabness Brook's catchment could contain permanent infrastructure ($60m^2$; 0.06%). If the final position of the onshore export cables is towards the centre of west/south-west of the onshore cable route, there may not be any permanent infrastructure in this catchment. In a worst case there could be some routine maintenance required throughout the operational life of the Project. Operational foul water from the onshore substation will be treated using a septic tank as there are no mains sewers close to the onshore substation. The size of the septic tank will be confirmed at later phase. The onshore substation will be minimally staffed and unlikely to contribute extra nutrient loadings at a catchment scale. As assessed in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23), the magnitude of impact for operational activities associated with the supply of contaminants (including fine sediment) and changes to surface and groundwater flows and flood risk in all catchments is negligible. Significance of effect for all catchments is either negligible or minor adverse depending on catchment sensitivity. Due to the very small area of each catchment that could be affected by operational activities, changes to temperature, pH, oxygenation, salinity or nutrient concentrations are not anticipated.	
	Could the activity release dangerous chemicals into the water body?	Construction Construction activities, particularly the use of 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 and the accidental release of construction materials, such as concrete, and inert drilling fluids from trenchless crossings.	In

Parameter	Scoping question	Scoping assessment	Scoping decision
		It should be noted that the onshore project area only just crosses into Wrabness Brook's catchment (the area of onshore cable route in this catchment is approximately 0.01km^2 (1 ha) (0.09%). The potential for impacts would be very limited to a small area near Horsley Cross.	
		Operation As described in the Co-located Substation Early Design Drainage Strategy, all transformers at the onshore substation will have a totally sealed bund with a sump which has a water control unit to pump any water out. Rainfall captured within the transformer's bund area will be intercepted by an oil discriminating pump connected to an oil separator tank or passed through a filter unit, which will discharge separated water into the site surface water drainage system. As assessed in ES Chapter 21 Water Resources and Flood Risk (Document reference: 3.1.23), the magnitude of impact for operational activities associated with the accidental release of contaminants to surface and groundwater in all catchments is negligible. Significance of effect for all catchments is either negligible or minor adverse depending on catchment sensitivity. Due to the very small area of each catchment that could be affected by operational activities, changes to hydromorphology and/or physico-chemistry are not anticipated. For any unplanned (emergency) repair work along the onshore cable route, and for work associated with reinstatement and removal of the haul road industry good practice mitigation would be in place to minimise the likelihood of an accidental release and put in place procedures for an effective response to any pollution event.	Out
Invasive Non-Native Species (INNS)	Could the activities introduce or spread INNS?	Construction and operation Works have the potential to release invasive species if materials and equipment used in the process have not been properly cleaned after use at a previous location that may have had	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		invasive species present. However, good practice measures will be employed to ensure all equipment is cleaned and checked before use.	

3.2.2 Coastal water bodies

Table 3.3 Scoping assessment for Essex (GB650503520001) coastal water body

Parameter	Scoping question	Scoping assessment	Scoping decision
Water bodies assessed: Essex (GB650503520001)			
Project components assessed: Offshore project area: offshore cable corridor (including trenchless techniques), cable protection			
Biology	Is the footprint of the activity 0.5 km^2 or larger?	Construction The worst case scenario for construction is sand wave levelling activities (24m width for each export cable (48 m total for two cables)). The length of overlap between the offshore cable corridor and the coastal water body is 11.31km, however up to 90% of this length would require levelling. In the remaining 10% length, c.5% of the cable length would be installed subsea by Horizontal Directional Drill (HDD) (i.e. no footprint in the water body) and c.5% installed by trenching (1m width per cable). The maximum area of disturbance is therefore 0.49km^2 (i.e. 11.31 km x 90% x 0.024km (disturbance width) x 2 cables + 11.31km x 5% x 0.001km (disturbance width) x 2 cables). As assessed in ES Chapter 8 Marine Geology, Oceanography and Physical Processes (Impact 3: Changes in Suspended Sediment Concentration (SSCs) due to export cable installation) (Document Reference: 3.1.10), although sediment plumes associated with sand wave levelling may temporarily impact on water quality, SSCs will be lower than concentrations that would develop in the water column during storm conditions. Once the disturbance activity is completed, tidal currents are likely to rapidly disperse the suspended sediment (i.e. over a period of a few hours) in the absence of any further sediment input.	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		Operation It is assumed that cable protection may be required along 10% of the offshore export cable length within the coastal water body. The width of the coastal water body crossed by the offshore export cable is 11.31km. Therefore 10% of the remaining cable length is 1.13km and the maximum width of protection is 6 m, giving a maximum area for protection of 0.0067km^2. If the unprotected offshore export cables become exposed (length of 11.31km), they will need to reburied using the cable burial methods described in ES Chapter 5 Project Description (Document reference: 3.1.7). The maximum width of reburial disturbance would be 2m. There would be some disturbance of the seabed, but this would be highly localised (0.02km^2 footprint) and infrequent. This is a maximum figure as it is highly unlikely that all of the unprotected offshore export cable would become exposed at any one time.	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 disturbed by the offshore export cable installation is approximately 0.49km^2 and the coastal water body is 1196km^2. The worst case area of activity is therefore significantly less than 1% (0.04%).	Out
		Operation As outlined above, the maximum indicative width of rock berm cable protection required equates to 0.0.0067km^2 of the water body. This is significantly less than 1% of the area of the water body. If the offshore export cables become exposed, they will need to reburied using the cable burial methods described in ES Chapter 5 Project Description (Document Reference: 3.1.7). The	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		maximum width of reburial disturbance would be 2m. There would be some disturbance of the seabed, but this would be highly localised (<1% of the water body's area) and infrequent.	
	Within 500m of any higher sensitivity habitat?	Construction and operation There are no higher sensitivity habitats within 500m of the offshore project. The closest habitat (polychaete reef) is over 5km away from the offshore project area.	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) and subtidal soft sediment (sand, mud and mixed). The area of gravel and cobbles within the Essex water body is approximately 11.5km^2 (Environment Agency, 2016 (updated 2023)) which equates to approximately 4.2% of the habitat. Although cable installation may cause some temporary disturbance of these communities, up to 4.2% of subtidal coarse sediment, 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 ES Chapter 10 Benthic and Intertidal Ecology (Document Reference: 3.1.12), that they are likely to recover and therefore there will not be a permanent effect on this habitat within the water body. Subtidal soft sediments characterise an area of 56.5km^2.of the Essex water body (Environment Agency 2023) Based on a maximum disturbance area of 0.49km^2, 0.87% of the habitat would be disturbed.	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		Operation A maximum of 0.0067km^2 of the coastal water body would be affected by cable protection. This equates to 0.06% of the area of gravel and cobbles and 0.01% of the area of subtidal soft sediments. If the offshore export cables become exposed, they will need to reburied using the cable burial methods described in ES Chapter 5 Project Description (Document Reference: 3.1.7). The maximum width of reburial disturbance would be 2m per cable. There would be some disturbance of the seabed, but this would be highly localised and affect 0.17% of the area of gravel and cobbles and 0.34% of the area of subtidal soft sediment.	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 approximately 7km away from the closest estuarine (transitional) water body (Hamford Water). 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 expected	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 a small area of	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		unburied cable protection will not impact fish migration. Electromagnetic Fields attenuate rapidly in both horizontal and vertical plains with distance from the source and the cables would be reburied, thereby minimising the effect on fish.	
	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 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. ES Chapter 11 Fish and Shellfish Ecology (Document Reference: 3.1.13) concludes effects on fish would be negligible or minor. For operational activities, impacts on fish are also predicted to be negligible or minor.	Out
	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 Construction work has the potential to contribute to the spread of invasive species if materials and equipment used in the process have not been properly cleaned after use at a previous location that may have had invasive species present. However, good practice measures would be employed to ensure all equipment is cleaned and checked before use.	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		Operation In theory, cable protection could create an artificial reef that could be colonised by INNS. However, cable protection would only spread INNS if they were already present in the coastal water body. The introduction of cable protection itself would not spread INNS. The surrounding region has existing hard infrastructure in place, for example from wrecks and existing offshore wind farms, the construction of the Project, is unlikely to introduce new species or habitats which are not already present in the study area. (Chapter 10 Benthic and Intertidal Ecology (Document Reference: 3.1.12)).	Out
Hydromorphology	Could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status?	Construction and operation The water body is not at high status.	Out
	Could significantly impact the hydromorphology of any water body?	Construction As assessed in ES Chapter 8 Marine Geology, Oceanography and Physical Processes (Impact 3: Changes in SSCs due to export cable installation) (Document Reference: 3.1.10), installation of the offshore export cables has the potential to disturb the shallow sub-seabed down to an average of 1.2m (depending on the area) and a width of up to 2m. Sand wave levelling associated with export cable installation could affect an area up to 48m in width. The maximum area of disturbance would by 0.49km^2. Although sediment plumes may temporarily impact on water quality, SSCs will be lower than concentrations that would develop in the water column during storm conditions. Once the disturbance activity is completed, tidal currents are likely to rapidly disperse the suspended sediment (i.e. over a period of a few hours) in the absence of any further sediment input. Effects on a water body scale are therefore not predicted.	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		Operation As assessed in ES Chapter 8 Marine Geology, Oceanography and Physical Processes (Operational Impact 6: Morphological and sediment transport effects due to cable protection measures within the offshore cable corridor) (Document Reference 3.1.10), as a worst case scenario, it has been assumed that burial of the export cables may not practicably be achievable within some areas of the offshore cable corridor and, instead, cable protection measures would need to be provided to surface-laid cables in these areas. Cable protection is unlikely to be in place within 1.5km of the shore because a commitment has been made to install the export cable at the landfall using trenchless techniques. The HDD exit will be subtidal up to 1.5km from shore, thus avoiding direct disturbance in the intertidal zone. While the sensitivity of the Essex coast water body is predominantly medium, the presence of coastal protection along the Tendring Peninsula means that changes to the sediment transport regime would have an effect of negligible significance on the Tendring coast. Cable protection could form a similar function to the existing groynes, which are aimed at restricting the flow of sediment to protect the coastline. If the offshore export cables become exposed, they will need to reburied using the cable burial methods described in ES Chapter 5 Project Description (Document Reference: 3.1.7). The maximum width of reburial disturbance would be 2m with a maximum footprint of 0.02km^2.There would be some disturbance of the seabed, but this would be highly localised and infrequent and would not significantly impact the hydromorphology of any water body.	Out
	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

Parameter	Scoping question	Scoping assessment	Scoping decision
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 Although there would be an increase in suspended sediment concentrations due to the HDD exit pit and cable burial techniques (the HDD exit pit will be located subtidally up to 1km from shore). 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.	Out
		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 Phytoplankton status is High.	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	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		An inert drilling fluid (bentonite) will be used for the trenchless crossing. A Contingency Plan, in accordance with the Outline Horizontal Directional Drill Method Statement and Contingency Plan (Document Reference 7.15) will be in place. This mitigation will minimise the likelihood of an accidental release and put in place procedures for an effective response to any pollution event	
	It disturbs sediment with contaminants above Cefas Action Level 1?	Construction and operation Site specific data collected to inform the Environmental Impact Assessment (EIA) indicates that, with the exception of arsenic, sediment contaminant concentrations are low (ES Chapter 9 Marine Water and Sediment Quality, (Document Reference: 3.1.11)). 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. 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.	Out

Table 3.4 Scoping assessment for Hamford Water (GB680503713700) coastal water body

Parameter	Scoping question	Scoping assessment	Scoping decision
Water bodies assessed: Hamford Water (GB680503713700)			
Project components assessed: Onshore project area: onshore cable route			
Hydromorphology	Could the activity change the hydrological regime or morphological conditions of the water body, or create a permanent barrier to upstream continuity, of a water body at high status?	Construction Hamford Water will not experience any direct disturbance during construction because the water body will not be crossed by the Project. There is also very limited interaction with watercourses in the upstream coastal catchment. The Project does not cross any Main Rivers that drain to Hamford Water. Only one trenched crossing and two haul road crossings would be required on ordinary watercourses that drain to Hamford Water. The trenched crossing is 1.4km upstream of Hamford Water. As assessed in ES Chapter 21 Water Resources and Flood Risk, approximately 1.16 % of the coastal catchment would be affected by construction activities in the onshore project area. Chapter 21 of the ES Water Resources and Flood Risk has assessed magnitude of impact in the coastal catchment as negligible, and significance of effect is minor adverse (due to high sensitivity). Since direct disturbance of Hamford Water will not take place, and construction work in the upstream coastal catchment would be small scale and temporary, it is considered unlikely that construction activities would change the hydrological regime or morphological conditions of the water body, or create a permanent barrier to upstream continuity	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		Operation No permanent infrastructure would be located in Hamford Water. As assessed in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23), only a very small area of the upstream coastal catchment will contain permanent infrastructure (0.06km2; 0.15%). The presence of the buried onshore export cables in the upstream coastal catchment is considered very unlikely to affect the hydrological regime or morphological conditions of the downstream water body.	Out
	Could the activity significantly impact the hydromorphology of any water body	Construction Hamford Water will not experience any direct disturbance during construction because the water body will not be crossed by the Project. There is also very limited interaction with watercourses in the upstream coastal catchment. The Project does not cross any Main Rivers that drain to Hamford Water. Only one trenched crossing and two haul road crossings would be required on ordinary watercourses that drain to Hamford Water. The trenched crossing is 1.4km upstream of Hamford Water. As assessed in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23), approximately 1.16 % of the coastal catchment would be affected by construction activities in the onshore project area. Chapter 21 of the ES Water Resources and Flood Risk (Document Reference: 3.1.23) has assessed magnitude of impact in the coastal catchment as negligible, and significance of effect is minor adverse (due to high sensitivity). Since direct disturbance of Hamford Water will not take place, and construction work in the upstream coastal catchment would be small scale and temporary, it is considered unlikely that construction activities would significantly impact the hydromorphology of any water body.	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		Operation No permanent infrastructure would be located in Hamford Water. As assessed in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23), only a very small area of the upstream coastal catchment will contain permanent infrastructure (0.06km2; 0.15%). The presence of the buried onshore export cables in upstream coastal catchment is considered very unlikely to significantly impact the hydromorphology of any water body.	Out
	Is the activity in a water body that is heavily modified for the same use as the activity?	Construction and operation The water body is not designated artificial or heavily modified.	Out
Water quality	Could the activity change water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (c. 14 days)?	Construction Hamford Water will not experience any direct disturbance during construction because the water body will not be crossed by the Project. There is also very limited interaction with watercourses in the upstream coastal catchment. The Project does not cross any Main Rivers that drain to Hamford Water. Only one trenched crossing and two haul road crossings would be required on ordinary watercourses that drain to Hamford Water. The trenched crossing is 1.4km upstream of Hamford Water. As assessed in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23), approximately 1.16 % of the coastal catchment would be affected by construction activities in the onshore project area. Chapter 21 of the ES Water Resources and Flood Risk (Document Reference: 3.1.23) has assessed magnitude of impact in the coastal catchment as negligible, and significance of effect is minor adverse (due to high sensitivity). Since direct disturbance of Hamford Water will not take place, and construction work in the upstream coastal catchment would be small scale and temporary, it is considered unlikely that	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		construction activities would affect salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle.	
		Operation No permanent infrastructure would be located in Hamford Water. As assessed in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23), only a very small area of the upstream coastal catchment will contain permanent infrastructure (0.06km2; 0.15%). The presence of the buried onshore export cables in upstream coastal catchment is considered very unlikely to would affect salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle.	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
	Is the activity in a water body with a phytoplankton status of moderate, poor or bad?	Construction The phytoplankton status of Hamford Water was Moderate in 2019 and 2022 (Environment Agency, 2022). Hamford Water will not experience any direct disturbance during construction because the water body will not be crossed by the Project. There is also very limited interaction with watercourses in the upstream coastal catchment. The Project does not cross any Main Rivers that drain to Hamford Water. Only one trenched crossing and two haul road crossings would be required on ordinary watercourses that drain to Hamford Water. The trenched crossing is 1.4km upstream of Hamford Water. As assessed in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23), approximately 1.16 % of the coastal catchment would be affected by construction activities in the onshore project area. Chapter 21 of the ES Water Resources and Flood Risk (Document Reference: 3.1.23) has assessed magnitude of impact in the coastal catchment as negligible, and significance of effect is minor adverse (due to high sensitivity). Since direct disturbance of Hamford Water will not take place, and construction work in the upstream coastal catchment would be small scale and temporary, it is considered unlikely that construction activities would affect parameters that could affect phytoplankton (i.e. salinity, oxygen levels, nutrients).	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		Operation No permanent infrastructure would be located in Hamford Water. As assessed in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23), only a very small area of the upstream coastal catchment will contain permanent infrastructure (0.06km²; 0.15%). The presence of the buried onshore export cables in upstream coastal catchment is considered very unlikely to affect parameters that could affect phytoplankton (i.e. salinity, oxygen levels, nutrients).	Out
	Is the activity in a water body with a history of harmful algae?	Construction Harmful algae are not monitored in Hamford Water. Since Hamford Water will not experience any direct disturbance during construction it is considered very unlikely that construction activities would have an impact on any algae present in the water body (e.g., entrainment of algae that can promote new algal growth; nutrient enrichment within the sediment).	Out
		Operation No permanent infrastructure would be located in Hamford Water. The presence of the buried onshore export cables in upstream coastal catchment is considered very unlikely to impact any algae present in the water body	Out
	Does the activity use or release chemicals? If so, are they on the EQSD list?	Construction An inert drilling fluid (bentonite) will be used for the trenchless crossing. A Contingency Plan, in accordance with the Outline Horizontal Directional Drill Method Statement and Contingency Plan (document reference 7.15) will be in place. This mitigation will minimise the likelihood of an accidental release and put in place procedures for an effective response to any pollution event.	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		Operation The presence of the buried onshore export cables in upstream coastal will not result in the release any chemicals to Hamford Water.	Out
	Will the activity disturb sediment with contaminants above Cefas Action Level 1?	Construction and operation Hamford Water will not experience any direct disturbance during construction because the water body will not be crossed by the Project.	Out
Biology (habitats)	Will the footprint of the activity cover an area of 0.5km2 or larger?	Construction and operation Hamford Water will not experience any direct disturbance during construction because the water body will not be crossed by the Project. No permanent infrastructure will be located in the catchment.	Out
	Is the area of either activity greater than 1% or more of the water body’s area?	Construction and operation Hamford Water will not experience any direct disturbance during construction because the water body will not be crossed by the Project. No permanent infrastructure will be located in the catchment.	Out
	Will the footprint of the activity be within 500m of any higher sensitivity habitat?	Construction and operation At its closest, the onshore cable route will be approximately 900 m away from higher sensitivity saltmarsh habitat in Hamford Water. The closest points are related to access routes. During operation the buried onshore export cables would be just over 1km away from the saltmarsh habitat.	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
	Will the footprint of the activity cover 1% of lower sensitivity habitats in the water body?	Construction and operation Hamford Water will not experience any direct disturbance during construction because the water body will not be crossed by the Project. No permanent infrastructure will be located in the catchment.	Out
Biology (fish)	Is the activity in an estuary and could it 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 and operation Hamford Water will not experience any direct disturbance during construction because the water body will not be crossed by the Project. No permanent infrastructure will be located in the catchment.	Out
	Could the activity 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)?		Out
	Could the activity cause entrainment or impingement of fish?		Out
	Could introduce or spread Invasive non-native species (INNS)?	Construction and operation Construction work has the potential to contribute to the spread of invasive species if materials and equipment used in the process have not been properly cleaned after use at a previous location that may have had invasive species present. However, good practice measures would be employed to ensure all equipment is cleaned and checked before use.	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
Protected areas	Is the activity within 2km of any protected area?	Construction and operation The onshore project area is within 2km of protected areas in Hamford Water (Hamford Water SAC, Hamford Water Ramsar, Hamford Water SPA. Potential impacts on protected areas are assessed separately in Section 3.4.5. No Adverse Effects on Integrity (AEoI) have been identified in the Habitats Regulations Assessment (HRA) Report to Inform Appropriate Assessment (RIAA) for the SAC, Ramsar or SPA.	Out

3.2.3 Groundwater bodies

Table 3.5 Scoping assessment for groundwater bodies

Parameter	Scoping question	Scoping assessment	Scoping decision
Water body assessed: Essex gravels (GB40503G000400)			
Project components assessed: Onshore project area: landfall, onshore cable route (including construction accesses and TCCs), onshore substation and National Grid substation connection works.			

Parameter	Scoping question	Scoping assessment	Scoping decision
Groundwater quantity	Will the activity change groundwater levels affect Groundwater Dependent Terrestrial Ecosystems (GWDTEs) or dependent surface water features?	Construction Construction activities could cause localised changes to groundwater flows. There may be local changes to infiltration rates into the groundwater body due to installation of buried infrastructure causing alterations to subsurface flow routes. Any dewatering associated with trenching would be temporary and highly localised. Trenching would also be shallow (<2m) and any dewatering would be unlikely to significantly alter the movement or level of groundwater in the wider groundwater body (which measures 1274.6km2), or affect gross patterns of groundwater flow. Impacts on GWDTEs or dependent surface water features are not anticipated.	Out
		Operation There may be localised changes to flow paths and directions of groundwater in the vicinity of buried/near surface infrastructure (including reinstatement and removal of the haul road). The area of the groundwater body that could be affected is very small in comparison to the wider body of groundwater (0.016%). As a result, impacts on groundwater levels and associated GWDTEs are not expected.	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. Dewatering would be localised and temporary and would not affect recharge of the wider groundwater body (which measures 1274.6km2).	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
	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 consumptive abstraction is planned. Any groundwater abstraction would be limited to localised dewatering of near surface groundwaters during subsurface excavations in the construction phase. Dewatering would be localised and temporary and would not affect recharge of the wider groundwater body (which measures 1274.6km2). Impacts on dependent surface waters are not expected.	Out
	Could the activity result in additional abstraction that will exceed any groundwater body scale headroom between the fully licensed quantity and the limit imposed by the total recharge?	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. Dewatering would be localised and temporary and would not affect recharge of the wider groundwater body (which measures 1274.6km2).	Out
Groundwater quality	Will the activities have the potential to result in or exacerbate widespread diffuse pollution at a water body scale?	Construction Should pollution during construction accidently occur, this would be limited to a very small proportion of the groundwater body (highly localised) and would not have an impact on diffuse pollution at the water body scale. An Outline Construction Code of Practice would also be in place. This mitigation would reduce the likelihood of an accidental release and put in place procedures for an effective response to any pollution event that could have an impact on groundwater resources.	Out
		Operation No mechanism for impact has been identified whereby widespread diffuse pollution could be created or exacerbated once the Project is operational. The risk of accidental spills or leaks	Out

Parameter	Scoping question	Scoping assessment	Scoping decision
		associated with reinstatement and removal of the haul road would be managed by standard industry good practice measures. Nutrients would be produced from the septic tank at the onshore substation, although the substation will be minimally staffed and very unlikely to result in or exacerbate widespread diffuse pollution at a water body scale.	
	Will the activities have the potential to result in pollution of GWDTEs or cause deterioration in the quality of a drinking water abstraction?	Construction Activities such as trenchless techniques and open cut trench excavations to construct the onshore cable route 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
		Operation No mechanism for impact has been identified whereby pollutant trends could increase once the Project is operational. The risk of accidental spills or leaks associated with reinstatement and removal of the haul road would be managed by standard industry good practice measures. The small scale of potential operational nutrients released from the septic tank at the onshore substation means impacts on GWDTEs are considered unlikely.	Out
	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 Construction activities (e.g. open cut trench excavations and trenchless techniques) could potentially introduce contaminants into groundwater. This could lead to an increase in pollutant concentrations within the groundwater body.	In

Parameter	Scoping question	Scoping assessment	Scoping decision
		Operation No mechanism for impact has been identified whereby pollutant trends could increase once the Project is operational. The risk of accidental spills or leaks associated with reinstatement and removal of the haul road would be managed by standard industry good practice measures. The small scale of potential operational nutrients released from the septic tank at the onshore substation means increasing trends in pollutants, or a reduction in the ability of the water body to reverse significant trends, are unlikely.	Out
	Will the activity lead to saline intrusion?	Construction Although there may be some very localised increases in salinity in the vicinity of the landfall trenchless technique bore, there would not be any consumptive abstraction of groundwater during construction or operation, which would cause a drawdown in the underlying groundwater body. As the landfall is above mean sea level, the head difference would also limit any minor changes in salinity.	Out
		Operation Once the Project is operational there would be no mechanism whereby saline intrusion could occur into the underlying groundwater body.	Out

3.3 Impacts on RBMP improvement and mitigation measures

42. 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 3.6.

43. Measures in river water bodies 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.

44. 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 3.6. For measures not in place for the Essex coastal water body, there are no current plans to realign the flood defences under which the landfall HDD will be drilled. The future implementation or effectiveness of mitigation measures will not be affected.

45. 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 1.3). There would be no mechanisms to affect the proposed measures during decommissioning.

Table 3.6 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

Water body	Measure	Type
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

46. All water-dependent protected areas associated with water bodies screened into the assessment are listed in Table 3.7 and evaluated below.

Table 3.7 Water dependent protected areas

Water body/protected area	ID	Directive
Holland Brook		
Sandlings and Chelmsford Nitrate Vulnerable Zone (NVZ)	G78	Nitrates Directive
Holland Brook NVZ	S438	Nitrates Directive
Tenpenny Brook		

Water body/protected area	ID	Directive
Sandlings and Chelmsford NVZ	G78	Nitrates Directive
Tenpenny Brook NVZ	S435	Nitrates Directive
Wrabness Brook		
Sandlings and Chelmsford NVZ	G78	Nitrates Directive
Essex		
Hamford Water SPA	UK9009131	Conservation of Wild Birds Directive
Frinton	UK11300	Bathing Water Directive
Holland	UK11350	Bathing Water Directive
Hamford Water		
Hamford Water Special Protected Area (SPA)	UK9009131	Conservation of Wild Birds Directive
Hamford Water Special Area of Conservation (SAC)	UK0030377	Conservation of Habitats and Species Regulations
Hamford Water Ramsar	UK11028	Ramsar Site
Essex Gravels		
Sandlings and Chelmsford NVZ	G78	Nitrates Directive
Tenpenny Brook NVZ	S435	Nitrates Directive
Holland Brook NVZ	S438	Nitrates Directive
Essex Gravels	UKGB40503G000400	Drinking Water Protected Area

3.4.1 Bathing waters

47. Two bathing waters are within 2km of the offshore project area (Holland and Frinton). As assessed in ES Chapter 8 Marine Geology, Oceanography and

Physical Processes (Impact 3: Changes in SSCs due to export cable installation) (Document Reference: 3.1.10), installation of the offshore export cables has the potential to disturb the shallow sub-seabed down to an average of 1.2m (depending on the area) and a trench width of up to 1m. In addition, a wider area (up to 24m width) may be disturbed by sand wave levelling. A trench will also be required at the HDD exit location, which will be located on the seabed up to 1.5km from shore. Although sediment plumes may temporarily impact on bathing waters, SSCs will be lower than concentrations that would develop in the water column during storm conditions. Once jetting is completed, tidal currents are likely to rapidly disperse the suspended sediment (i.e. over a period of a few hours) in the absence of any further sediment input.

48. ES Chapter 9 Marine Water and Sediment Quality (Document Reference: 3.1.11) has assessed the significance of effect on designated bathing waters as temporary and of minor adverse significance.

49. Embedded mitigation for pollution control would minimise the likelihood of an accidental release offshore and put in place procedures for an effective response to any pollution event.

50. Bathing waters are therefore scoped out of the assessment.

3.4.2 Nitrates

51. The onshore project area crosses three Nitrate Vulnerable Zones (NVZs):

- Sandlings and Chelmsford;
- Holland Brook; and
- Tenpenny Brook.

52. Foul drainage from construction welfare facilities will be tankered off-site for treatment, preventing impacts to NVZs. Since there are no public sewers in the vicinity of the onshore substation site (according to the Anglian Water sewer records), it is not possible to make a foul connection to a public sewer. A septic tank is therefore proposed for the substation site (Tenpenny Brook's catchment). The size of the septic tank will be confirmed at a later phase of the project. The onshore substation will be minimally staffed and unlikely to contribute extra nitrates at a catchment scale. Impacts on NVZs are scoped out of the assessment.

3.4.3 Drinking water protected area

53. All groundwater bodies are classified as Drinking Water Protected Areas due to the potential for qualifying abstractions of water for human consumption. Of the two licensed abstractions within the onshore project area for spray irrigation one is sourced from groundwater and there are other licenced and private abstractions within 1km of the onshore project area for agricultural and domestic use. As assessed in Table 3.5, impacts on groundwater quantity are not expected due to the small scale of construction and operation activities. Some potential impacts on groundwater quality have been scoped in (Table 3.5), which are evaluated further in Section 4.3.

3.4.4 Shellfish waters

54. The onshore project area is 2.2km away from the nearest shellfish waters (Walton Backwaters). No mechanism for impact has been identified and shellfish waters are scoped out of the assessment.

3.4.5 Habitats and species directive, conservation of wild birds directive

55. The following protected areas are within 2km of the onshore project area:
    - Hamford Water Ramsar;
    - Hamford Water SAC; and
    - Hamford Water SPA.

56. A detailed assessment of impacts of the Project on these designated sites can be found in the HRA RIAA and a summary is provided here.
    - Hamford Water SPA and Ramsar:
        - Qualifying features (bird species) for Hamford Water SPA and Ramsar are listed in the HRA RIAA Part 5 Onshore European and Ramsar Sites (Document Reference: 7.1.5). Direct and indirect impacts on ex-situ habitats would be temporary and limited in spatial extent. Results from baseline surveys suggest that the onshore project area is of limited importance for Hamford Water SPA qualifying features, and even where peak numbers represent a notable part of the SPA population (in the case of brent goose), frequency of occurrence is low. It is therefore unlikely that habitat loss would result in impacts on survival or productivity at a population level for any qualifying feature and as such, AEoI of Hamford Water SPA are not predicted alone or due to in-combination construction effects. It can also be reasonably concluded that no AEoI of the Hamford Water Ramsar site will occur.
    - Hamford Water SAC:
        - The SAC is designated primarily for the presence of the Annex II species Fisher's estuarine moth *Gortyna borelli lunata* which is only found in two UK locations, the north Essex coast and the north Kent coast. The evidence presented above indicates that, when taking into consideration mitigation, AEoI of Hamford Water SAC will not occur due to the project either alone or in-combination with other projects.

57. Designated sites associated with Hamford Water and scoped out of the assessment.

3.5 Stage 2 summary

58. 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):
  - Holland Brook;
  - Tenpenny Brook;
  - Wrabness Brook
- Groundwater body (groundwater quality element):
  - Essex Gravels.
- Protected areas:
  - Essex Gravels Drinking Water Protected Area.

4 Stage 3: Detailed compliance assessment

59. This section presents the results of the impact assessment undertaken on the water bodies scoped in at stage 2 for further assessment, using the method outlined in Section 2. This assessment determines whether elements of the Projects brought forward from Stage 2 would cause deterioration of water bodies, and whether such deterioration would have a significant non-temporary effect on the status of one or more quality elements at a water body level.

4.1 Embedded control measures

60. The detailed compliance assessment has been informed by embedded control measures established for ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23). Table 4.1 shows embedded project control measures for water resources.

Table 4.1 Onshore water resources embedded control measures

Parameter	Mitigation measures embedded into North Falls design
Watercourse crossings (construction phase)	
Cable crossings beneath watercourses	All Main Rivers (see Figure 21.1, 3.2.17) will be crossed using trenchless techniques to avoid direct interaction with these watercourses. Most Ordinary Watercourses will also be crossed using trenchless techniques. Bentonite is an inert clay-based material (comprising 95% water and 5% clay) used as a lubricant at the drill head for trenchless crossing techniques. An Outline Horizontal Directional Drill Method Statement and Contingency Plan (Document Reference: 7.15) has been submitted with the Project's DCO application. This outline plan sets out the steps will be taken to minimise the risk of effects of watercourses as a result of a bentonite 'breakout' during HDD. It details both the measures proposed to reduce the risk of a breakout occurring, and the contingency plans steps to reduce the extent of the breakout and to clean up the spill should it occur. In summary, these steps include: • Pre-drilling ground conditions assessment and hydrofracture modelling to target formations with lower risk of breakout; • Use of drill casing in softer, surface deposits; • Constant fluid monitoring during drilling, so that a breakout can be identified as soon as it occurs;

Parameter	Mitigation measures embedded into North Falls design
	• Provision of appropriate spill management supplies and staff training on breakout management on site; • Process of containment and spill removal once a spill has been identified. Please refer to the Outline Horizontal Directional Drill Method Statement and Contingency Plan (Document Reference: 7.15) for full details of the measures proposed.
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. Selection of a crossing technique for Ordinary Watercourses not crossed using trenchless techniques will be dependent on local site conditions and may include the use of temporary culverts. If temporary culverts are required, they will be adequately sized to avoid impounding flows (including allowing for increased winter flows as a result of climate change) and the invert set below bed level to allow bedload transport.
Trenched crossings	• Where temporary dams are used: • The onshore export cables would typically be installed a minimum of 3m below the channel bed (dependent on local geology and geomorphological risks). This would avoid exposure during periods of higher energy flow when the bed could be mobilised. This depth takes into consideration anticipated climate-change related changes in fluvial flows and erosion that will occur over time. At Tendring Brook (Main River) the HDD will be down to 9m depth; • The amount of time that temporary dams or flumes are in place will be kept to a minimum; • Flumes or pumps would be adequately sized to ensure that flows downstream are maintained whilst minimising upstream impoundment; • 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; • If a diversion channel is required, geotextiles or similar techniques will be used to line the channel and prevent sediment entering the watercourse; • Vegetation would not be removed from the banks unless necessary to undertake the works, in which case removal would be restricted to the smallest practicable footprint; • Channel bed and banks would be sympathetically reinstated (e.g. by replacing re-sectioned banks with more natural profiles that are typical of the natural geomorphology of the watercourse). • Prior to dewatering the area between the temporary dams, a fish rescue would be undertaken.
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 OCoCP (Document Reference: 7.13) is being submitted with the DCO application, which includes outline soil management measures and outline the mitigation measures and industry good practice techniques, which contractors would be obliged to comply with. The DCO contains a requirement to submit a final Code of Construction Practice (CoCP) and Soil Management Plan (SMP) (which must be in accordance with the OCoCP (Document Reference: 7.13)) prior to commencement of construction.
Exposed land (construction and operational maintenance phases)	

Parameter	Mitigation measures embedded into North Falls design
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 the Environment Agency's 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) practice will also be adhered to (e.g. Control of water pollution from construction sites: Guidance for consultants and contractors (C532) (CIRIA, 2001)), as well as Defra's Code of Practice for the Sustainable Use of Soil on Construction Sites (Defra, 2009). Specific measures will 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; • 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 10m from 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 industry good practice measures include: • Limiting the extent of open excavations along the onshore cable route 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 project 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. • At the onshore substation temporary swales are proposed along the perimeter of the construction compound to intercept and attenuate runoff (and sediment) before discharge to a temporary attenuation pond via a filter drain/pipe running along the length of the temporary haul road (the temporary pons will be located in tenpenny Brook's catchment). Full details of the construction drainage strategy at the onshore substation can be found in the Co-located Substation Early Design Drainage Strategy (Mott MacDonald, 2023).
Supply of contaminants (construction and operational maintenance phases)	

Parameter	Mitigation measures embedded into North Falls design
Use and storage of potential contaminants	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 route 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 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. At the onshore substation it is anticipated that areas of the construction compound, such as refuelling stations and wheel wash areas will require bunding and/or additional proprietary treatment before discharge to the wider drainage network. Full details of the construction drainage strategy at the onshore substation can be found in the Outline Operational Drainage Plan (Document Reference: 7.19). During operation of the substation the proposed drainage system and treatment train is to be designed to comply with the water quality design criteria outlined in the CIRIA SuDS manual. Full details of the operational drainage strategy at the onshore substation can be found in the Outline Operational Drainage Plan (Document Reference: 7.19). To protect groundwater bodies, excavation will be shallow (0.9 – 1.65m below ground level), 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 phases)	
Surface water runoff	• Changes in surface water runoff resulting from the increase in impermeable area following construction of the onshore cable route, and particularly the onshore substation, would be attenuated and discharged at a controlled rate, in consultation with the LLFA (Essex County Council) and the Environment Agency. An Outline Operational Drainage Plan has been developed for the

Parameter	Mitigation measures embedded into North Falls design
	Project, which includes SuDS. Full details of the drainage strategy at the onshore substation can be found in the Outline Operational Drainage Plan (Document Reference: 7.19). • 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 (Document Reference: 7.13). including outline soil management measures has been submitted with the DCO and the DCO contains a Requirement to submit a final CoCP and SMP prior to commencement of construction. • Construction drainage would 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; • As described for watercourse crossings, temporary culverts will be adequately sized to avoid impounding flows. • At the onshore substation temporary swales are proposed along the perimeter of the construction compound to intercept and attenuate runoff before discharge to a temporary attenuation pond via a filter drain/pipe running along the length of the temporary haul road (the temporary pons will be located in tenpenny Brook's catchment). Full details of the construction drainage strategy at the onshore substation can be found in the Co-located Substation Early Design Drainage Strategy (Mott MacDonald, 2023). • During operation of the substation, the current strategy is to discharge all surface water runoff from impermeable surfaces across the scheme at restricted rates into an unnamed ordinary watercourse located to the south of the overall site. Discharge will be at the undeveloped greenfield rate. The substation design includes a permanent attenuation pond and attenuation swale for the access road. Full details of the operational drainage strategy at the onshore substation can be found in the Co-located Substation Early Design Drainage Strategy (Mott MacDonald, 2023).
Groundwater quality and abstractions for public water supply (construction and operational maintenance phases)	
Cable routing	• The onshore cable route 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 trenchless crossing location. • A written scheme dealing with contamination of any land and groundwater will be prepared before construction activities commence.

4.2 River water bodies

4.2.1 Hydromorphology (hydrological regime and morphological conditions)

4.2.1.1 Construction activities

61. 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.

62. 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 (Document Reference: 3.3.27) 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 to be high in most catchments, associated with evidence of channel maintenance (vegetation clearance and desilting) and the dominance of arable land use.

63. The onshore cable route will use trenchless methods to cross main rivers and most 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 3.7shows methods of watercourse crossing for each watercourse type within each water body catchment.

64. Although there is potential for impacts on the hydrological regime and morphological condition of water bodies due to trenched watercourse crossings (Table 4.2), impacts would be localised because only one trenched crossing is required is most catchments. The exception is Wrabness Brook, where there are no trenched crossings. As assessed in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23) significance of effect from the direct disturbance of surface water bodies is negligible or minor adverse (depending on catchment sensitivity, defined for the purposes of the EIA in ES Chapter 21 (Document Reference: 3.1.23)).

Table 4.2 Watercourse crossing methods in water body catchments

Catchment	Trenchless crossings	Trenched crossings	Haul road only crossings (e.g. culvert or bridge)
	Main River and Ordinary Watercourses	Ordinary Watercourses	
Holland Brook	10	1	2

Catchment	Trenchless crossings	Trenched crossings	Haul road only crossings (e.g. culvert or bridge)
	Main River and Ordinary Watercourses	Ordinary Watercourses	
Tenpenny Brook	1	1	2
Wrabness Brook	0	0	0
Coastal catchment	3	1	2

65. 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.

66. The maximum possible areas of disturbed ground in each water body receptor are shown in Table 4.3. Areas of exposed land due to construction activities range from 0.01 to 2.32km^2 and 0.09 to 2.42% catchment area. The higher figures of 2.06% and 2.42% for Tenpenny Brook and Holland Brook relate to the onshore substation being in Tenpenny Brook's catchment, and the longest section of onshore cable route in Holland Brook's catchment (in addition to the landfall). As assessed in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23), significance of effect for increased sediment supply is negligible or minor adverse (depending on catchment sensitivity).

Table 4.3 Areas of disturbed ground in each water body catchment

Catchment	Estimated total area of disturbed ground during construction	
	km	%
Holland Brook	2.32	2.42
Tenpenny Brook	0.62	2.06
Wrabness Brook	0.01	0.09
Coastal catchment	0.46	1.16

67. There are a low number of trenched and temporary crossings in each catchment, and the areas of each catchment that could be disturbed during construction are small. Control measures for trenched and temporary crossings and increased sediment supply are also embedded into the project design (Table 3.6). It is therefore unlikely that construction activities would cause a deterioration in water body status or prevent status objectives being achieved in the future.

4.2.2 Physico-chemistry (general, priority substances)

4.2.2.1 Construction activities

68. Construction activities could result in accidental release of fuels, oils and lubricants 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.

69. An independently managed foul water drainage system is proposed to serve the welfare and toilet facilities within the temporary construction compound. It is assumed that the foul water will be contained on site and regularly pumped, emptied, and transported off site. Accidental releases of foul water during construction are not expected.

70. An increase in sediment supply from any disturbed soils along the cable route 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. Disturbance of agricultural land could release nutrients in the soil into adjacent water bodies.

71. 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 water bodies, impacting on overall dissolved oxygen, pH and temperature.

72. As shown in Table 4.2, there are a very low number of trenched crossings required within each water body catchment, and maximum potential areas of disturbed soil are small. With control measures in place to manage disturbance from trenched and temporary crossings, increased sediment supply and the supply of contaminants, it is unlikely that construction activities would cause a deterioration in water body status or prevent status objectives being achieved in the future.

4.2.3 Biology (aquatic flora, benthic invertebrates, fish)

4.2.3.1 Construction activities

73. 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.

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

75. However, as shown in Table 4.2, there are a very low number of trenched crossings required within each water body catchment, and maximum potential areas of disturbed soil are small. Given the proposed control measures that would be implemented to prevent construction impacts to hydromorphology and physico-chemistry (Section 4.2.1; Section 4.2.2) these measures would 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 would cause a deterioration in water body status or prevent status objectives being achieved in the future.

4.3 Groundwater bodies

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

4.3.1.1 Construction activities

76. 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 and also affect groundwater abstractions.

77. As assessed in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23), a very small proportion of the Essex Gravels groundwater body (0.16%) (which is a Drinking Water Protected Area) would be directly affected by construction activities in the onshore project area. Across the entire groundwater catchment (1,274.6km^2), these activities are considered very unlikely to lead to significant changes in groundwater quality. With control measures in place to manage the risks associated with the supply of contaminants (Table 3.6) magnitude of impact and significance of effect have been assessed as negligible and minor adverse (due to medium sensitivity) in ES Chapter 21 Water Resources and Flood Risk (Document Reference: 3.1.23).

78. Given the small scale of construction work in the groundwater body catchment, the Project is very unlikely to cause a deterioration in water body status or prevent it achieving a Good overall status. Impacts on groundwater abstractions and the wider Essex Gravels Drinking Water Protected Area (DWPA) are not anticipated.

5 Stage 4: Summary of assessment and mitigation requirements

79. Results of the WER compliance assessment process are summarised in Table 5.1.

Table 5.1 Summary of WER 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	✓	✓	×	×

80. The relatively small scale of construction activities (few trenched crossings and relatively small areas of disturbed ground) combined with embedded control measures 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 of or beyond the current River Basin Planning Cycle) to the status of any of the river and groundwater bodies assessed. Potential operational activities would be limited to the onshore substation. Construction activities will not prevent water body status objectives being achieved in the future. The Project is therefore considered to be compliant with WER requirements.

6 References

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HARNESSING THE POWER OF NORTH SEA WIND

North Falls Offshore Wind Farm Limited

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