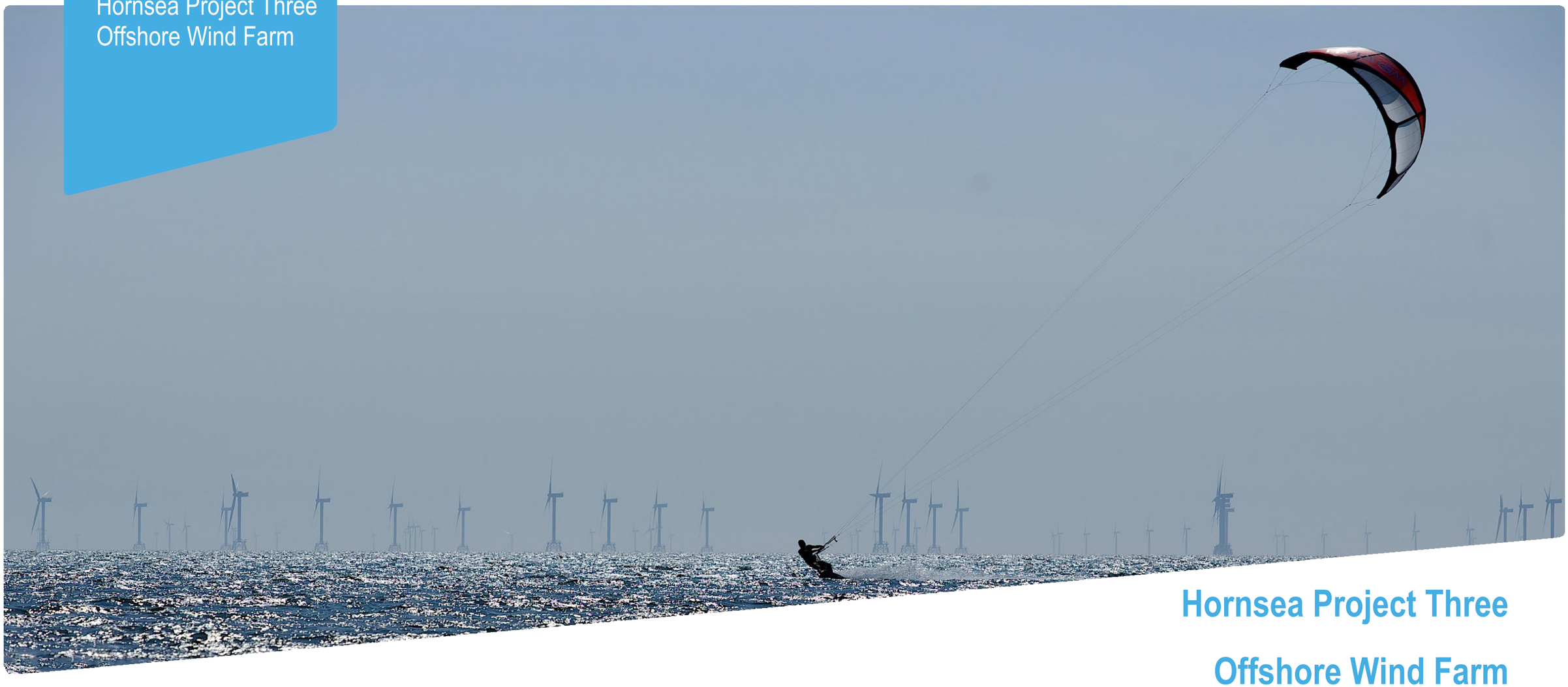
Hornsea Project Three
Offshore Wind Farm



Hornsea Project Three

Offshore Wind Farm

Environmental Statement:
Volume 6, Annex 2.5 – Water Framework Directive Surface Water Assessment

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Date: May 2018

Hornsea 3
Offshore Wind Farm

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Environmental Impact Assessment

Environmental Statement

Volume 6

Annex 2.5 – Water Framework Directive Surface Water Assessment

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5 Howick Place,

London, SW1P 1WG

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Prepared by: RPS

Checked by: Sarah Drljaca

Accepted by: Stuart Livesey

Approved by: Stuart Livesey

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Glossary

Term	Definition
Catchments	An area that serves a watercourse with rainwater. Every part of land where the rainfall drains to a single watercourse is in the same catchment.
Chemical Status	Chemical status is assessed from compliance with environmental standards for chemicals that are priority substances and/or priority hazardous substances.
Diffuse sources	Non-point sources primarily associated with runoff and other discharges related to different land uses such as agriculture and forestry, from septic tanks associated with rural dwellings and from the land spreading of industrial, municipal and agricultural wastes.
Discharge consents	Consent granted by the Environment Agency to discharge into watercourses, subject to conditions.
Ecology	The study of the relationships among organisms and between those organisms and their non-living environment.
Ecological Quality Ratio	Measure of the deviation of biological elements from undisturbed or reference conditions.
Ecological Status	An expression of the structure and functioning of aquatic ecosystems associated with surface waters. Such waters are classified as being of good ecological status when they meet the requirements of the Water Framework Directive.
Ecosystem	A community of interdependent organisms together with the environment they inhabit and with which they interact; community and environment being distinct from adjacent communities and environments.
Environmental Objective	Objective setting considered waters that require protection from deterioration as well as waters that require restoration and the timescales needed for recovery.
Field drainage	Limiting the effect of flooding by maintaining surface water and land drainage systems.
Geology	The scientific study of the origin, history and structure of the earth.
Good Status	A collective term used to refer to the status achieved by a surface water body when both its ecological status and its chemical status are at least good or, for groundwater, when both its quantitative status and chemical status are at least good.
Ground Conditions	An assessment of the history and chemical and physical characteristics of the soil conditions at a site.
Groundwater	All water which is below the surface of the ground in the saturated zone and in direct contact with the ground or subsoil.
Heavily Modified Water Body	A water body that has been changed substantially in character as a result of physical alterations by human activity.
Hydrology	The study of the movement, distribution, and quality of water.
Hydromorphology	A study of the quantity and dynamics of water flow within a water body that has variations in its width, depth, structure and substrate of bed and riparian zone.
Invasive Non-Native Species	Non-native plants or animals that successfully establish themselves in aquatic and fringing habitats and damage natural flora and fauna.
Main rivers	The term used to describe a water course in respect of which the Environment Agency has permissive powers in relation to its management.
Minor watercourses	The term used to describe a water course owned and operated by a local Drainage Board, a Lead Local Flood Authority or a private land owner.
Mitigation Measures	Measures to avoid, prevent, minimise, reduce or, as fully as possible, offset or compensate for any significant adverse effects on the environment, as a result of implementing a plan or programme.
Morphology	Term used to describe channel form and its process of change in shape and direction over time.
Natura 2000 site	A Special Area of Conservation (SAC) or candidate SAC, a Special Protection Area (SPA) or potential SPA, a site listed as a site of community importance or a Ramsar site.
Non-statutory designated sites	Non-statutory designated sites are sites which have been designated due to their nature conservation interest, typically through the local planning process, which are usually protected by planning policies but not legally protected.
One-out, all-out	The Water Framework Directive uses the "one-out, all-out" principle in assessing water bodies (i.e., the worst status of the elements used in the assessment determines the final status of the water body).
Onshore elements of Hornsea Three	Hornsea Three landfall area, onshore cable corridor, the onshore HVAC booster station, the onshore HVDC converter/HVAC substation and the interconnection with the Norwich Main National Grid substation.
Preliminary Scoping	Identifying links between the proposed activity and every quality element of the status classification that could be affected. It is also necessary at this stage to consider activities and how they affect the morphological mitigation measures for those waterbodies, where applicable.
Priority Substances and Priority Hazardous Substances	33 substances or groups of substances are on the list of priority substances for which environmental quality standards were set in 2008, including selected existing chemicals, plant protection products, biocides, metals and other groups like Polyaromatic Hydrocarbons that are mainly incineration by-products and Polybrominated Biphenylethers that are used as flame retardants.
Programme of Measures	Those actions, defined in detail, which are required to achieve the environmental objectives of the Directive within a river basin district.
Protected Area	Water protected by European legislation including drinking waters, shellfish waters, bathing waters, urban wastewater nutrient sensitive areas or sites designated as Special areas of Conservation or Special Protected Areas.
Quality Element	Biological, hydromorphological, physico-chemical and chemical elements that contribute to the Water Framework Directive status classification.
River Basin District	Administrative area for coordinated water management composed of multiple river basins (or catchments).
River Basin Management Plan	The purpose of a river basin management plan is to provide a framework for protecting and enhancing the benefits provided by the water environment.
Sites of Special Scientific Interest	Sites designated by Natural England under the Wildlife and Countryside Act 1981 (as amended) as areas of land of special interest by reason of any of their flora, fauna, or geological or physiographical features.
Surface Water	Inland waters on the land surface (such as reservoirs, lakes, rivers, transitional waters, coastal waters) within a river basin.

Term	Definition
Water body	A coherent sub-unit in the river basin (district) to which the environmental objectives of the directive must apply. Hence, the main purpose of identifying "water bodies" is to enable the status to be accurately described and compared to environmental objectives
Water Framework Directive	Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. The Directive promotes water management through river basin planning. It covers inland surface waters, estuarine waters, coastal waters and groundwater.
Water Quality	The physical, chemical and biological characteristics of water.

Acronyms

Acronym	Description
CoCP	Code of Construction Practice
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
HWWB	Heavily Modified Water Body
NEAS	National Environmental Assessment Service
PEIR	Preliminary Environmental Report
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SSSI	Site of Special Scientific Interest
SWMI	Significant Water Management Issues
TJB	Transition Joint Bay
UWWTD	Urban Waste Water Treatment Directive
WFD	Water Framework Directive

Units

Unit	Description
m	Metre (distance)
km	Kilometre (distance)
kV	Kilovolt (electric potential)

1. Introduction

1.1 Background

1.1.1.1 This annex reports on a site-specific Water Framework Directive (WFD) surface water assessment prepared for the development of the onshore elements of the Hornsea Project Three offshore wind farm (hereafter referred to as 'Hornsea Three'). The onshore elements comprise the Hornsea Three landfall area, onshore cable corridor, onshore HVAC booster station and the onshore HVDC converter/HVAC substation and the interconnection with the Norwich Main National Grid substation. The compounds, storage areas and access roads are also considered.

1.1.1.2 A WFD groundwater assessment has been undertaken and is set out in annex 1.4: Water Framework Directive Groundwater Assessment. A WFD for coastal waters has also been undertaken and this can be found in volume 5, annex 2.2: Water Framework Directive Assessment.

1.1.1.3 Whilst Environmental Impact Assessment is an efficient mechanism to gather the relevant information for WFD compliance assessment, it still needs to be interpreted in relation to WFD. According to Environment Agency (EA) guidance, impacts of biology, chemistry and hydromorphology need to be considered in relation to WFD status classes and reported under a specific WFD section in any environmental statement or report produced or in a separate WFD compliance report (Environmental Agency, 2010). Therefore, a WFD compliance assessment has been undertaken to demonstrate how any impact on WFD receptors caused by the different activities associated with Hornsea Three fits with the objectives of any affected WFD surface water bodies. The compliance assessment has also offered the opportunity to inform the design of Hornsea Three (see volume 1, chapter 4: Site Selection and Consideration of Alternatives) to avoid, minimise, mitigate or compensate for the risks to WFD surface water receptors where the risk assessment determined that the activities have the potential to:

i. Cause a surface water body to deteriorate from one WFD status class to another or cause localised impacts that could contribute to this happening; and
ii. Prevent or undermine action to get surface water bodies to good status (e.g. compromise the programme of measures put in place to achieve the ultimate water body objective).

1.2 WFD surface water assessment scope

1.2.1.1 This WFD surface water assessment uses the hydrology and flood risk study area (as defined in volume 3, chapter 2: Hydrology and Flood Risk).

1.2.1.2 In order to achieve the aims outlined within section 1.1.1.3, a staged approach has been adopted in undertaking the WFD compliance assessment in accordance with National Environmental Assessment Service (NEAS) Operational Instruction 488_10 SD01 (Environment Agency, 2010).

1.2.1.3 The WFD surface water assessment comprises two stages:

- A preliminary screening assessment was undertaken to review each onshore component of the proposed scheme in terms of potential impact to the water environment. The screening assessment summarises potential impact to the water environment for each component of each WFD quality element. This screening defines the scope of the detailed assessment, identifies potential issues and provided an opportunity to engage with the Competent Authority (EA) to agree the scope of the detailed assessment.
- A detailed assessment was undertaken to examine the potential impact on surface water bodies (including cumulative impacts), suggesting mitigation measures and enhancements where appropriate. This also considers whether the scheme will contribute to the delivery of the relevant River Basin Management Plan (RBMP) (i.e. Anglican RBMP).

1.3 Report structure

1.3.1.1 For the purposes of undertaking the WFD surface water assessment for Hornsea Three, the broad methodologies outlined in the aforementioned EA were modified and incorporated into this Annex in a similar format to WFD compliance assessment template form provided by the EA. The steps undertaken for this assessment are outlined in Figure 1.1: WFD compliance process

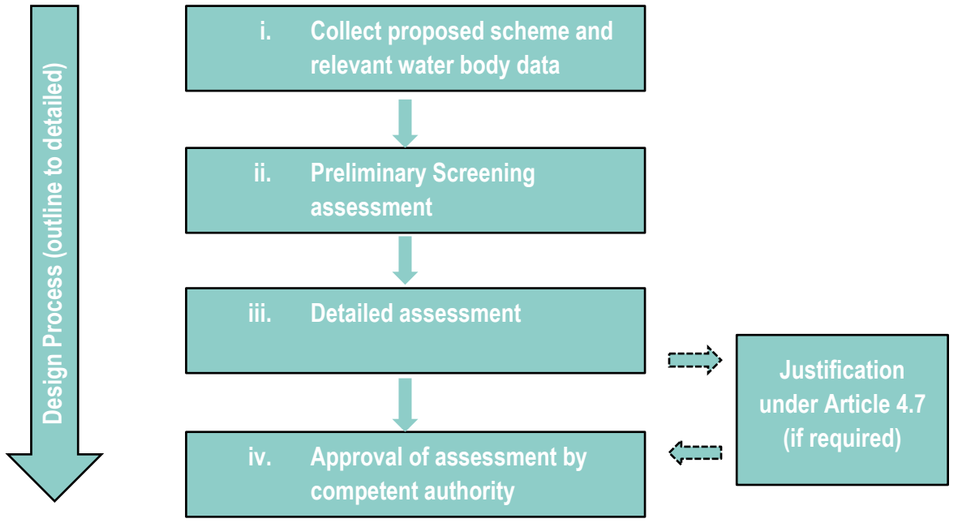

Figure 1.1: WFD compliance process

1.3.1.2 This annex has the following structure:

- Section 2 identifies the sources of information that have been consulted in preparation of the WFD surface water assessment;
- Section 3 sets out relevant legislation and guidance;
- Section 4 provides a project description detailing the aspects (or activities) associated with Hornsea Three which could have the potential to impact on the objectives of the WFD (prepared based on the WFD compliance assessment template provided by the EA);
- Section 5 sets out the baseline environment in the context of the surface water bodies impacted;
- Section 6 provide a preliminary assessment of Hornsea Three and concludes whether a more detailed assessment is required;
- Section 7 provides a more detailed assessment of the potential impact of Hornsea Three on the WFD objectives; and
- Section 8 provides the conclusions and summary of the assessment.

2. Information Sources

2.1.1.1 The information used in the preparation of this annex is set out in Table 2.1.

Table 2.1: Information sources consulted during the preparation of the surface water assessment.

Source	Data	Information consulted/provided
Ordnance Survey (OS).	OS Mapping 1: 50 000 Sheet 133: north east Norfolk.	Area information, rivers and other watercourses, general site environments, built environment, catchment information.
	OS Mapping 1: 50 000 Sheet 134: Norwich & The Broads.	
EA	EA catchment data explorer.	Water body classification, overall status, ecological status, biological elements, physico-chemical elements, hydro-morphology and chemical classification.
		WFD objectives for surface water bodies.
		Programme of Measures for surface water bodies.
	WFD Water body Summary Tables.	Water body status, objectives, hydro-morphology, protected areas, sensitive habitats.
	Anglican RBMP.	Overview of the River Basin District and programme of measures.
	Water body spatial data.	River, Transitional, Coastal water body layers.
	Data from EA regional Office.	• Current maintenance regime; • Source Protection Zones (1 & 2) & ground water quality issues; • Abstraction licences, groundwater levels (data); • Statutory designated sites; • County Wildlife Site within proximity; • Priority habitat; • Aquatic species present; • Ambitions for improvement; • Recommended method (Horizontal Directional Drilling (HDD), open trench etc.); and • Mitigation and legacy recommendations.
Internal Drainage Board (IDB)	Norfolk Rivers IDB.	Local Drainage Networks.
WFD Guidance	Assessing new modifications for compliance with WFD: detailed supplementary guidance.	Operational Instruction 488_10 SD01.
	WFD assessment: estuarine and coastal waters.	Carrying out WFD compliance assessment in stages.
Annex 2.4: Hydrological Characterisation Report	Hydrological characterisation of key watercourse crossing points of the Hornsea Three onshore cable corridor.	Abstractions, discharges, hydrological and hydrogeological information, sensitive habitats, designations, extent of HDD crossings, landowner consultation.
Volume 3, chapter 3: Ecology and Nature Conservation	Baseline, impact assessment on ecology and nature conservation.	Surveys for different aquatic species including invasive non-native species, impact and mitigation strategy.
Volume 3, chapter 2: Hydrology and Flood Risk	Baseline, impact assessment on hydrology and flood risk.	Baseline environment, impact assessment and mitigation strategy.
Outline Code of Construction Practice (CoCP)	Mitigation strategy during construction phase.	Mitigation measures which will be implemented as part of Hornsea Three.

3. Legislation and Guidance

3.1 Water Framework Directive

3.1.1.1 The WFD (Council Directive 2000/60/EC establishing a framework for community action in the field of water policy) was adopted by the European Commission in December 2000. The WFD requires that all European Union Member States prevent deterioration and protect, enhance and restore all bodies of water. This means that Member States must ensure that new schemes do not adversely impact upon the status of aquatic ecosystems, and that they must address historical modifications that are already impacting a water body.

3.1.1.2 The WFD was transposed into national law by means of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003. These regulations provide for the implementation of the WFD through the designation of all surface waters (rivers, lakes, transitional (estuarine) and coastal waters) and groundwaters as water bodies and the establishment of targets to achieve good ecological status by 2015, or where justified, by 2021 or 2027. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 have now been repealed and replaced by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (subject to transitional arrangements).

3.1.1.3 The WFD applies to all water bodies, including those that are both natural and man-made. The consideration of the proposals under the WFD will therefore apply to all surface water bodies that have the potential to be impacted by Hornsea Three.

3.1.2 Water Body Classification

3.1.2.1 The WFD specifies the quality elements that are used to assess the ecological and chemical status of a water body. Quality elements are generally biological (e.g. fish, invertebrates, macrophytes) or chemical (e.g. heavy metals, pesticides, nutrients). Classifications indicate where the quality of the environment is good, where it may need improvement, and what may need to be improved. They can also be used, over the years, to plan improvements, show trends and to monitor the effectiveness of the programme of measures identified. There are two status classifications which are commonly reported, ecological and chemical.

3.1.2.2 Chemical status is assessed from compliance with environmental standards for chemicals that are priority substances and/or priority hazardous substances. These are known as 'Annex X' substances as they were originally listed in Annex X of the WFD, which has now been superseded by the Environmental Quality Standards Directive (2008/105/EC). Chemical status is recorded as 'good' or 'fail'. Chemical status for a water body is determined by the worst scoring chemical (one-out-all-out approach).

3.1.2.3 Ecological status classifications can be composed of up to four different assessments:

- An assessment of status indicated by a biological quality element such as fish, invertebrates or algae. The presence of invasive species is also assessed as a separate test;
- An assessment of compliance with environmental standards for supporting physico-chemical conditions, such as dissolved oxygen, phosphorus or ammonia;
- An assessment of compliance with environmental standards for concentrations of specific pollutants, such as zinc, cypermethrin or arsenic (these are known as 'Annex VIII' substances); and
- And in determining high status only: A series of tests to make sure that hydromorphology is largely undisturbed.

3.1.2.4 Ecological status is recorded as high, good, moderate, poor or bad. 'High' represents 'largely undisturbed conditions'. Other classes show increasing deviation from undisturbed or reference conditions. This deviation must be expressed as an ecological quality ratio which ranges from zero for bad status to one for high status. As with chemical status, ecological status is determined by the worst scoring component (one-out-all-out approach).

3.1.2.5 Biological status is a sub-set of ecological status where the results of the biological quality elements are assessed (and so ignore physico-chemical and Annex VIII substances and hydromorphology). The one-out-all-out rule is applied again here to give a biological status classification.

3.1.2.6 Overall status is a composite measure that looks at both ecological status and chemical status. So, it takes into account all four assessment types under ecological status (biology, physico-chemical, Annex VIII substances and hydromorphology) as well as incorporating the results of the chemical status assessment (priority substances). The one-out-all-out rule is applied again here, so a water body must be good or better ecological status, and good (pass) chemical status assessment to be given a good overall status.

3.1.3 Water Body Objectives

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

- Objective 1: To prevent deterioration in the ecological status of the water body;
- Objective 2: To prevent the introduction of impediment to the attainment of Good WFD status for the water body;

- Objective 3: To ensure the attainment of the WFD objectives for the water body are not compromised; and
- Objective 4: To ensure the achievement of WFD objectives in other water bodies within the same catchment are not permanently excluded or compromised.

3.2 Guidance

3.2.1.1 There is no designated formal methodology for the assessment of projects in relation to undertaking WFD compliance assessments in England. There are, however, several sets of guidance that have been developed in relation to undertaking such assessments, written by the EA. The most relevant to Hornsea Three comprise 'Clearing the Waters' (Environment Agency, 2012), which has been produced to assist in the assessment of the potential impact of dredging and disposal on the requirements of the WFD; 'Assessing new modifications for compliance with WFD' NEAS Operational Instruction 488_10) (Environment Agency, 2010); and an EA internal operational instruction which has been produced to guide WFD assessment of new modifications to surface waters.

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

4. Project Description

4.1 Project components with potential to impact WFD objectives

4.1.1.1 The components of Hornsea Three that have the potential to impact on the WFD objectives are outlined below. A description of these components is contained in volume 1, chapter 3: Project Description.

- Hornsea Three landfall area;
- Hornsea Three onshore cable corridor;
- Joint Bays and link boxes;
- Crossings (e.g. of roads, watercourses, infrastructure);
- Access routes;
- Construction compounds;
- Onshore HVAC booster station;
- Onshore HVDC converter/HVAC substation; and
- Connection to Norwich Main National Grid.

4.2 Activity type

4.2.1.1 Based on the onshore elements of Hornsea Three outlined above, the activity types which have been considered to have potential to impact the achievement of the WFD objectives have been identified for consideration within this WFD Compliance Assessment. The following activity types are considered to potentially pose detriment risk to the water environment in the absence of mitigation:

- Topsoil stripping, excavation and stockpiled earth (including reinstatement);
- Use of oils, chemicals and cement in the vicinity of open water;
- Construction of above ground infrastructure (i.e. the HVAC booster station and HVDC converter/HVAC substation;
- Construction and use of temporary bridges and culverts;
- Watercourse crossings (HDD or open cut);
- Construction and use of construction compounds; and
- Construction and use of temporary access roads.

4.2.1.2 More detail on the potential watercourse crossing techniques is provided below.

4.2.2 Horizontal Direction Drill

4.2.2.1 HDD involves drilling a long parabolic borehole underneath the surface from a predetermined launch pit to a receiver pit. The process uses a drilling head controlled from the rig to drill a pilot hole along a predetermined profile based on an analysis of the ground conditions and cable installation requirements. This pilot hole is then widened using larger drilling heads until the hole is wide enough to fit the cable ducts. Bentonite is pumped to the drilling head during the drilling process to stabilise the hole and ensure that it does not collapse (also acting as a lubricant).

4.2.2.2 The exact depth and length of each HDD will be dependent on the nature of the obstruction being crossed as well as the ground conditions present at each site. The location of the HDDs is shown in the Onshore Crossing Schedule that will accompany the application. Each major HDD will require a compound at each side of the crossing to house the HDD rig and the various supporting equipment and components required. Further details on the equipment and processes to be used can be found in volume 1, chapter 3: Project Description.

4.2.3 Open cut

4.2.3.1 It may be preferable for certain crossings to be carried out as an open cut crossing, rather than a HDD. These crossings could range from smaller drains, gas and power distribution infrastructure and small roads, to high pressure gas pipelines.

4.3 Location of the works

4.3.1.1 The onshore elements of Hornsea Three starts near Weybourne (at approximate easting 610464, northing 343653) and continues in a generally southerly direction towards the village of Swainsthorpe, south of Norwich City (at approximate easting 622076, northing 302075), as shown in Figure 4.1. The surface water bodies that are within the hydrology and flood risk study area are illustrated in Figure 4.1.

Figure 4.1: WFD surface water bodies

4.4 Surface water bodies affected

4.4.1.1 The surface water bodies in Table 4.1 have been identified as being potentially affected by Hornsea Three. The surface water bodies were selected using a Geographic Information System spatial query to identify water bodies within the hydrology and flood risk study area, and scoped into the assessment based on proximity to the works and hydrological connectivity.

4.4.1.2 The construction programme for Hornsea Three will occur over one or two phases as outlined in volume 1, chapter 3: Project Description. The maximum durations for the onshore elements of Hornsea Three are:

- Onshore cable corridor: The maximum duration over which construction could occur would be 5.5 years incorporating two phases (assuming a three-year gap between the two phases);
- Onshore HVAC booster station: The maximum duration of construction for the onshore HVAC booster station is two years, this therefore means that the maximum duration over which construction could occur would be five years incorporating two phases (assuming a three-year gap with no active construction activity between the two phases); and
- Onshore HVDC converter/HVAC substation: The maximum duration of construction for the onshore HVDC converter/HVAC substation is three years, therefore the maximum duration over which construction could occur would be six years incorporating two phases (assuming a three-year gap with between the two phases).

Table 4.1: Surface water bodies impacted by Hornsea Three

Water body affected (WFD Code)	Length affected (m)	Hornsea Three onshore element which may affect surface water body
Glaven (GB105034055780)	80	Onshore cable corridor Landfall area
Bure (u/s of confluence with Scarrow Beck) (GB105034055690)	112	Onshore cable corridor Onshore HVAC booster station
Blackwater Drain (GB105034051120)	90	Onshore cable corridor
Wensum US Norwich (GB105034055881)	209 (109m + 100m - two separate sections affected)	Onshore cable corridor
Tud (GB105034051000)	80	Onshore cable corridor
Swannington Beck (GB105034051070)	85	Onshore cable corridor
Yare (Tiffey to Wensum) (GB105034051280)	85	Onshore cable corridor Onshore HVDC converter/HVAC substation
Intwood Stream (GB105034051240)	83	Onshore cable corridor

5. Baseline Environment

5.1 WFD water body status classification

5.1.1.1 The overall, ecological and chemical status of the surface water bodies listed in Table 5.1 has been established through consultation with the catchment data explorer (http://environment.data.gov.uk/catchment-planning/), consultation with the EA regional office and a hydrological characterisation study (see volume 6, annex 2.4: Hydrological Characterisation Report) of the river water bodies that could be potentially affected by Hornsea Three.

5.1.1.2 When determining the ecological status classification, the biological, physico-chemical, hydromorphological and specific pollutants supporting elements have also been established to ensure that the activities associated with Hornsea Three, as outlined in Table 4.1 above, are assessed against each of these elements and will not compromise the objectives of the WFD resulting in a non-compliant assessment. Table 5.1 highlights the overall, ecological and chemical status as well as the key supporting element driving the status classification based on the 2015 baseline. The Anglican RBMP states that the 2015 water body classification is the baseline from which deterioration should be avoided. All contributing elements to the status classification are included in the water body tables included in Appendix A of this annex. These tables form the basis of the preliminary assessment from which activities associated with the different components of Hornsea Three are scoped into the detailed assessment for WFD compliance.

Table 5.1: WFD status classification for surface water bodies and the key elements driving status classification.

Water body affected (WFD Code)	Overall Status	Ecological Status	Chemical Status	Heavily Modified Water body (HMWB)	Driving element for status classification	WFD Objective
Glaven (GB105034055780)	Moderate	Moderate	Good	No	*Biology* - Macrophytes and phytobenthos	Good 2027
Bure (u/s of confluence with Scarrow Beck) (GB105034055690)	Poor	Poor	Good	No	*Biology* – Fish	Poor 20125 Poor 2021 Good 2027
Swannington Beck (GB105034051070)	Poor	Poor	Good	Yes	*Biology* - Fish	Good 2015
Blackwater Drain (GB105034051120)	Moderate	Moderate	Good	Yes	*Biology* - Macroinvertebrates, *Physico-chemical* - Dissolved oxygen	Good 2021
Wensum US Norwich (GB105034055881)	Moderate	Moderate	Good	Yes	*Biology* - Macrophytes and phytobenthos *Hydromorphological* – hydrological regime	Moderate 2015 Moderate 2021 Moderate 2027
Tud (GB105034051000)	Moderate	Moderate	Good	Yes	*Physico-chemical* - Phosphate	Moderate 2015 Moderate 2021 Moderate 2027
Yare (Tiffey to Wensum) (GB105034051281)	Moderate	Moderate	Good	Yes	*Biology* - Macrophytes and phytobenthos *Hydromorphological* – Hydrological regime	Moderate 2021 Good 2027
Intwood Stream (GB105034051240)	Moderate	Moderate	Good	Yes	*Physico-chemical* - Phosphate	Moderate 2015 Moderate 2021 Moderate 2027
Tas (Tasburgh to River Yare) (GB105034051230	Moderate	Moderate	Good	Yes	*Physico-chemical* - Phosphate	Moderate 2015 Moderate 2021 Moderate 2027

5.2 Heavily modified water bodies

5.2.1.1 Under Article 4(3) of the WFD Member States can designate surface water bodies as 'Heavily Modified Water Bodies'. A HMWB means a body of surface water which, as a result of physical alterations by human activity, is substantially changed in character, as designated by the Member State in accordance with the provisions of Annex II. If the specified use of such a water body (e.g. flood defence, water abstraction, land drainage) or the 'wider environment' would be significantly affected by the restoration measures required to achieve good ecological status, and if no other better, technically feasible, and cost-effective environmental options exist, then the environmental objective would be 'Good Ecological Potential'. This is in recognition of the fact that the water body will not achieve the ecological status of an unmodified natural water body. Those surface water bodies that have been classified as heavily modified are indicated in Table 5.1.

5.2.1.2 As can be seen from Table 5.1, the majority of surface water bodies that could be affected by Hornsea Three are HMWBs. The objective for these water bodies is therefore 'Good Ecological Potential'. Ecological potential in artificial and heavily modified water bodies is determined by an assessment of whether measures are properly in place to mitigate the impacts of any modification on the ecology of the water body. In WFD classification, this is referred to as the mitigation measures assessment. If all mitigation measures are in place, the water body would be classified as being at good potential. If one or more identified mitigation measures are absent, the water body would be classified at moderate potential. In both cases, if appropriate biological or chemical classifications are assessed to be at worse than good then the potential of the water body is classified by the worst scoring element according to the usual one-out-all-out procedure.

5.2.1.3 Table 5.2 summarises the morphological mitigation measures assessment. It is a requirement of the WFD compliance assessment to determine whether the project will compromise the achievement of the WFD objectives by inhibiting the effectiveness of these measures and preventing the achievement of the objectives in the relevant HMWBs.

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

Table 5.2: Morphological mitigation measures assessment.

Water body	Morphological mitigation measure	Status
Swannington Beck (GB105034051070)	Measures to address land drainage (operational management) and flood protection (sediment management).	Good
Blackwater Drain (GB105034051120)	Measures to improve the condition of the riparian zone and wetland habitats to address land drainage measures.	Moderate or less
Wensum US Norwich (GB105034055881)	Measures to manage abstraction pressure (i.e. change abstraction location).	Moderate or less
Tud (GB105034051000)	Measures in place to address pressure associated with hydrological regime.	Good
Yare (Tiffey to Wensum) (GB105034051280)	Measures to address pressures from abstractions and urban pressures not yet in place.	Moderate or less
Intwood Stream (GB105034051240)	Morphological mitigation measures not required.	Good
Tas (Tasburgh to River Yare) (GB105034051230	Morphological mitigation measures not required.	Good
Norfolk North Coastal Water (GB640503300000)	Morphological mitigation measures not required.	Good
Norfolk East Coastal Water (GB650503520003)	Morphological mitigation measures not required.	Good

5.3 Invasive non-native species

5.3.1.1 Some non-native animals and plants are invasive and can have significant social, economic and environmental impacts. Where they lead to greater erosion some plants, such as Himalayan balsam, can increase flood risk. Others like American signal crayfish can decrease river bank stability and most have negative impacts on ecology and leisure activities such as angling and water sports. There are also significant costs in controlling and safely disposing of invasive species such as Japanese knotweed on development sites and managing species such as zebra mussels, which can block pipes, intakes and other structures.

5.3.1.2 Many invasive non-native species spread rapidly and once they are established, control is often prohibitively expensive or technically infeasible and ultimately unsuccessful. Consultation with the EA and ecological surveys undertaken as part of Hornsea Three have established that the American Signal crayfish is present in the following surface water bodies:

- Bure (u/s of confluence with Scarrow Beck)(GB105034055690);
- Wensum US Norwich (GB105034055881);
- Blackwater Drain (GB105034051120); and
- Stannington Beck (GB1050340510.

5.3.1.3 Other species in this area that could also be transmitted to other locations along the onshore cable corridor include the Chinese Mitten Crab and Killer Shrimp.

5.3.1.4 Consultations with Natural England have established that the impact from disease is also a significant risk to the WFD ecological status. There is the potential that without appropriate biosecurity measures, construction activities may introduce crayfish plague to sites selected for crayfish relocations around North Norfolk. As well as the potential to spread species and disease across waterways, whilst working on the river bank, there is potential to spread invasive plant species such as Himalayan Balsam.

5.4 Protected areas

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

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

5.4.1.2 Protected areas are the areas of land and bodies of water that have specific uses which require special protection (relevant areas listed in Table 5.3). These include waters used for drinking water, bathing (recreational waters), commercial shellfish harvesting (economically significant), nutrient sensitive (both in terms of the Urban Wastewater Treatment Directive and the Nitrates Directive) and those that sustain the most precious wildlife species and habitats (Natura 2000 sites). These areas have legally binding objectives in place that protect those uses from potentially harmful activities and new developments.

5.4.1.3 The WFD assessment has considered the particular objectives and sensitivity associated with these protected areas and determined whether Hornsea Thee will result in an impact on the protected area objectives.

Table 5.3: Protected Areas linked to the surface water bodies potentially affected by Hornsea Three.

Water Body	Protected Area Type				
	Drinking Water	**Bathing Water**	**Economically significant**	**Nutrient Sensitive**	**Natura 2000 (SAC/SPA)**
Glaven (GB105034055780)	✓				
Bure (u/s of confluence with Scarrow Beck) (GB105034055690)				✓	
Swannington Beck (GB105034051070)				✓	
Blackwater Drain (GB105034051120)				✓	✓
Wensum US Norwich (GB105034055881)	✓			✓	✓
Tud (GB105034051000)				✓	✓
Yare (Tiffey to Wensum) (GB105034051281)				✓	
Intwood Stream (GB105034051240)				✓	
Tas (Tasburgh to River Yare) (GB105034051230				✓	
Norfolk North Coastal Water (GB640503300000)			✓		✓
Norfolk East Coastal Water (GB650503520003)		✓			✓

6. Preliminary Scoping Assessment

6.1 Potential impacts from construction activities

6.1.1.1 It is necessary to identifying links between the proposed activity and every quality element that could be affected. It is also necessary at this stage to consider activities and how they affect the morphological mitigation measures for those waterbodies, where applicable.

6.1.1.2 For all activities, the screening phase involves considering each WFD quality element to identify all those where a possible causal link exists. That is, where water body status or objectives could be affected at water body level by the proposed activities.

6.1.1.3 The scoping assessment has been applied for each activity type listed in section 4.2. The potential impacts for each activity are identified below which has informed the selection of the activities to be scoped into the assessment. The outcome of this initial assessment is summarised in the Table 6.1.

6.2 Preparation of Hornsea Three onshore cable corridor

6.2.1.1 The preparation of the Hornsea Three onshore cable corridor to facilitate construction will include erecting fencing along the onshore cable corridor progressively in working sections. Each working section will also be subject to topsoil stripping, stockpiling of stripped topsoil, and creation of haul roads for construction vehicle movements.

6.2.1.2 Temporary impacts on surface waters will occur during construction. Potential impacts associated with pollution from mobilised suspended solids (sediment) is generally considered the greatest risk. Suspended sediment due to runoff from stripped construction areas and excavations can have a negative impact on water quality, water dependant habitats and aquatic ecology. This is particularly true in sloping areas with underlying clay following topsoil stripping as well as areas of moderate to high rainfall.

6.2.1.3 Suspended solids within surface water bodies may have an effect on:

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

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

6.2.1.5 Direct mortality is the first stage in the damage that sediment causes to a benthic invertebrate population. Subsequent stages can be caused by sediment that infiltrates the river bed and decreases oxygen supply in interstitial areas, and destroys habitat for juvenile stages of the many benthic invertebrate life cycles.

6.2.1.6 The sediment subsequently provides a medium for macrophyte growth. Macrophytes can smother the river substrate and habitat further, and can trap more sediment which exacerbates the problem in the long term. Sediment infiltration of river bed gravels can also have a negative effect on fish species.

6.2.1.7 Potential sources of fine sediment during the construction phase include:

- Topsoil stripping/soil and vegetation clearance;
- Trench excavation and backfilling across minor watercourses and field ditches/drains (open-cut only);
- Installation of temporary crossing structures and associated movement of plant machinery;
- Bank disturbance caused by plant equipment;
- Runoff from topsoil and subsoil storage;
- Construction of dams and over-pumping to divert flow and allow excavation of the pipeline trench in under dry conditions in the channel;
- Water over-pumping and discharge of sediment laden water back to the watercourse;
- Removal of flumes/dams/crossing culverts; and
- Reinstatement of bank soils and vegetation.

6.2.1.8 There is also a potential to impact on drainage with the pathway to water courses and drainage ditches shortened resulting in faster delivery of water from the working corridor to water courses with possible changes to the flow regime which could result in impacts to biology and morphology through pressures such as scouring.

6.2.1.9 The Hornsea Three onshore cable corridor could provide a pathway for sediment laden runoff which could impact on the morphology of the channel resulting in a change in flow types, substrate condition and channel type.

6.3 Use of oils, chemicals and cement in the vicinity of open water

6.3.1.1 Concrete will be used during the construction process at the joint bays, link boxes, and as foundations for built structures such as onshore HVAC booster station and HVDC converter/HVAC substation.

6.3.1.2 The use of cement and concrete in the construction of the hardstanding areas and associated infrastructure has the potential to impact upon water quality. Fresh concrete and cement is highly alkaline and therefore is likely to affect water quality if washed into the water courses along the Hornsea Three onshore cable corridor.

6.3.1.3 Construction of Hornsea Three will involve the use of plant and machinery as well as the associated temporary storage of construction materials, oils, fuels and chemicals in designated areas within the temporary site compounds and in suitable mobile bowsers on the working spread. There is the potential for spillage or release of fuel oil and other dangerous substances which could impact on the surface water bodies associated with the working area. It is also possible that small residue amounts left on site may be mobilised by surface runoff and washed into the receiving waterbodies.

6.3.1.4 Any use of concrete, for example, to cover cable conduits in open cut construction poses a risk to aquatic species such as invertebrates and fish. Crossing of temporary flumes/bridges also poses a risk of spillage of such pollutants. Oils and petroleum in particular can have large impacts on aquatic species, and depending on the extent of a spill, may reduce respiration rates by altering oxygen exchange at the water-air interface or cause complete elimination of invertebrates and fish from streams.

6.4 Construction of onshore HVAC booster station and HVDC converter/HVAC substation

6.4.1.1 The likely impacts associated with the construction of the onshore HVAC booster station and HVDC converter/HVAC substation are associated with sediment release and the potential impacts from the use of oils, chemicals and cement which have been highlighted in the activities above.

6.4.1.2 The operational phase of the development will also require management, particularly in respect to drainage from these stations and ensuring that they do not increase flood risk or result in water quality or hydromorphological impacts through increased flows or outfalls to watercourses from conventional drainage design.

6.4.1.3 The operation of the onshore HVAC booster station and onshore HVDC converter/HVAC substation will involve routine maintenance. Maintenance may involve the use of chemicals, oils and greases and therefore, there is the potential for spillages to occur which may affect the water quality of surface watercourses.

6.5 Construction and operation of temporary bridges and culverts

6.5.1.1 Construction and operation of temporary bridges and culverts has the potential to affect the ecological status of the water body in terms of sediment release from site preparation works and release of other pollutants from required plant and machinery. This activity also has the potential to directly impact upon the morphological conditions of the watercourse. The installation of the flumes for the running track for plant access or bridging watercourses will only be a temporary measure and will not result in any long-term impact on the morphology of the rivers and streams traversed.

6.5.1.2 Where temporary flumes will also be installed to enable plant crossing, excavation of the riverbed to 'bed-in' the flume pipe could remove habitat and in-situ life-stages within the substrate, while placement of flumes for plant crossing followed by diversion of flow through the flume will cause loss of habitat through pipe covering, compaction, and crushing of crayfish and fish species in-situ. For benthic macroinvertebrates (excluding crayfish), the impacts are likely to be very localised because of the restricted area of excavation or flume placement (6-8 m length), coupled with the likelihood of rapid recolonization, predominantly from upstream habitats.

6.5.1.3 For sites with the potential presence of eels, lamprey or crayfish the impact could be greater than negligible magnitude and is graded as minor at medium and high sensitivity sites because it would constitute a short-term alteration to a population in a specific zone. Similarly, the effects of habitat loss or the compaction of substrate materials arising from flume placement and embedding are assessed as being of Minor magnitude.

6.5.1.4 Temporary damming and channel blocking associated with open-cut crossings would have the potential to obstruct fish passage for resident or migratory life-stages. The magnitude of impact will depend on the sensitivity of the water body and the duration of obstruction. Short term obstruction may cause localised population effects and would have effects of minor magnitude on small tributaries of medium sensitivity, and of moderate magnitude in main rivers of high sensitivity.

6.6 Water course crossings

6.6.1.1 The highest risk of impact from the onshore cable corridor on the water environment will occur at river crossings. Typical methods of crossing watercourses fall into two categories - open-cut and non-open-cut. The degree of risk may be considered higher for open-cut because it involves direct disturbance of the river bed and requires closer proximity of plant machinery to the watercourse. However, trenchless crossings, if fluming of the channel is also required for plant access, can also generate sediment through the placement of the flume in the channel albeit a much lower impact, or if there is a bentonite break out during drilling operations.

6.6.1.2 HDD methods could result in the escape to the watercourse of pressurised drilling fluids (bentonite/ mud) through break out of drilling fluids from the underlying bed material or from surface runoff caused by drilling fluid returns at tunnel entry and exit points. However, this occurs very infrequently as the drilling process is closely monitored and managed. These drilling fluids may be considered a type of fine sediment with similar general potential impacts to the general construction however the source and magnitude of impact is different given the fine particle size and the potential to infiltrate river substrate and sensitive habitats and thus, in the absence of mitigation could directly and indirectly have a negative impact on all biological quality elements.

6.6.1.3 Installation of the pipes by open cut means has the potential to impact on the hydromorphology of the river water body in the short to medium term through disturbance of the riparian zone, banks and channel adversely impacting the morphology and bank stability.

6.7 Construction, operation and reinstatement of temporary compounds

6.7.1.1 The construction, operation and reinstatement of temporary site compounds has the potential to contribute to issues discussed above in regards to the construction impacts associated with sediment release from site preparation works. There is also the risk of and release of other pollutants from fuel and chemical stores and any plant and machinery.

6.7.1.2 Access will be required to these construction compounds which may require new haul roads or alternatively improvement to existing routes. This could require temporary bridging or culverting of water courses and therefore the impacts outlined in section 6.5 apply.

6.7.1.3 The construction compounds will also have welfare facilities and adequate sewage facilities will be required so as not to impact on water quality. Additional facilities will need to be provided along the onshore cable corridor to ensure appropriate collection and treatment of sewage is undertaken so as not to impact on the aquatic environment.

6.8 Construction, operation and reinstatement of temporary access roads

6.8.1.1 Construction access roads will require the importation of clean permeable hard core for the road surface, therefore similar impacts to the Hornsea Three onshore cable corridor temporary working area are possible. Where the access road crosses a water course, the impacts identified above in section 6.4 associated with the fluming for the haul road in the temporary works area are relevant. Temporary bridges where used should not have a direct impact but should be set back from the river banks so as not to compromise bank stability. Existing land drainage will be avoided where possible so as to not hinder the operation of land drains and provide a potential pathway for pollutants from the access roads.

6.8.1.2 Table 6.1 summarises the different contributing elements to WFD status that have been screened in on the basis of the key activities outlined above and their potential impacts.

6.9 Operational and maintenance phase

6.9.1.1 The operation of the onshore HVAC booster station and onshore HVDC converter/HVAC substation will involve routine maintenance. Maintenance may involve the use of chemicals, oils and greases and therefore, there is the potential for spillages to occur which may affect the water quality of main and minor surface watercourses.

6.9.1.2 The Hornsea Three onshore cable corridor provides a lateral pathway for the movement of water which could indirectly affect water quality.

6.10 Decommissioning phase

6.10.1.1 During decommissioning, the dismantling of the onshore HVDC converter/HVAC substation and the HVAC booster station has the potential to cause adverse impacts on surrounding watercourses and receptors. The use of heavy vehicles and the removal of the infrastructure may lead to an increase in turbid runoff, reducing the water quality (in turn WFD classification) in surrounding watercourses.

6.10.1.2 Other activities on site could lead to an alteration in surface water flow pathways leading to runoff from decommissioning areas that could affect nearby watercourses. However, the decommissioning process would include measures to intercept runoff and ensure that discharges from the site are controlled in quality and volume causing no degradation in WFD classification. This may include the use of settling tanks or ponds to remove sediment, temporary interceptors and a hydraulic brake.

Table 6.1: Activities associated with Hornsea Three and outcome of preliminary scoping assessment for the WFD compliance assessment.

Activity	Biological supporting elements				Hydro-morphological supporting elements		Physico-chemical supporting elements	Chemical	
	Fish	Invertebrates	Macrophytes	Macrophytes and Phytobentos combined	Hydrological Regime	Morphology		Priority hazardous substances	Priority Substances
Preparation of temporary working corridor (See section 6.2 above for justification)	Scoped in				Scoped in		Scoped in	Scoped in	
Use of oils, chemicals and cement in the vicinity of open water (See section 6.3 above for justification)	Scoped in				Scoped out – should not have any impact on the physical attributes of the surface water bodies		Scoped in	Scoped in	
Construction of stations and substations (See section 6.4 above for justification)	Scoped in				Scoped in		Scoped in	Scoped in	
Construction and operation of temporary bridges and culverts (See section 6.5 above for justification)	Scoped in				Scoped in		Scoped in	Scoped in	
Water course crossings (See section 6.6 above for justification)	Scoped in				Scoped in		Scoped in	Scoped in	
Construction, operation and reinstatement of temporary access roads See section 6.7 above for justification)	Scoped in				Scoped in		Scoped in	Scoped in	
Construction, operation and reinstatement of temporary compounds (See section 6.8 above for justification)	Scoped in				Scoped in		Scoped in	Scoped in	
Operational and Maintenance phase (See section 6.9 above for justification)	Scoped in				Scoped out – given the nature of the routine maintenance there should be no impact on the hydromorphology of the surface water bodies		Scoped in	Scoped in	
Decommissioning phase (See section 6.10 above for justification)	Scoped in				Scoped out – there should be no further physical modification to water courses or the flow regime during the decommissioning phase		Scoped in	Scoped in	

7. Detailed Assessment

7.1 Introduction

7.1.1.1 Based on the outcomes of the preliminary screening assessment, this detailed assessment establishes whether the activities associated with Hornsea Three will:

- Cause deterioration in water body status;
- Impinge upon protected areas designated under the European Directives listed in Article 5 of the WFD and outlined in section 5.4 of this annex; and/or
- Prevent the achievement of WFD status objectives.

7.1.1.2 This is the stage of the assessment where evidence is provided to demonstrate that the proposed works are compliant. Specifically, for each quality element it must be shown that the activities scoped into the assessment will not cause deterioration in status nor prevent the achievement of WFD status objectives. Where appropriate it is also the stage where design mitigation, aimed at reducing the effect of an activity, is discussed.

7.1.1.3 The assessment looks at each individual water body traversed by Hornsea Three in the context of its status, the main contributing elements to the status classification, the objective of the water body and scoped in activities (see section 6).

7.2 Deterioration in water body status

7.2.1.1 As part of the Hornsea Three design process, a number of designed-in measures have been proposed to reduce the potential impacts for the water environment. As there is a commitment to implementing these measures, they are considered inherently part of the design of Hornsea Three and have therefore been considered in the assessment presented in this detailed WFD compliance assessment. These measures are considered standard industry practice for this type of development. The construction measures set out below are contained within an Outline CoCP (document reference A8.5).

7.2.1.2 The Anglican River Basin Management Plan (Environment Agency, 2016) states that the 2015 water body classification is the baseline from which deterioration is not permitted and therefore this is the status classification that must not deteriorate when considering the impact of Hornsea Three on the 'no deterioration of water body status' objective.

7.2.1.3 The detailed assessment demonstrates that taking into consideration the mitigation measures committed to through the Outline CoCP (document reference A8.5), the outline method statement for water course crossings, volume 3, chapter 2: Hydrology and Flood Risk and chapter 3: Ecology and Nature Conservation will ensure that there will be no deterioration in status irrespective of the WFD status classification outlined in Table 4.1 of this annex.

7.2.1.4 Table 7.1 provides the justification for this assessment based on the different quality elements and activities. A summary of the mitigation measures is also provided in Table 7.1.

7.3 Protected area objectives

7.3.1.1 A number of protected areas, listed on the register are located within the hydrology and flood risk study area. These protected areas have their own monitoring and assessment requirements to determine their condition. They are often assessed for additional pollutants or requirements relevant to their designation. For example, faecal coliform levels are assessed within shellfish and bathing waters. Therefore, it is important that the standards required for these protected areas are also met. If they are not met, a water body which would otherwise meet the requirements of the WFD, may have the status reduced to 'less than good' as it is not meeting the protected area objectives. The surface water bodies within the hydrology and flood risk study area that contain protected areas listed in the register of protected areas are detailed in Table 5.3.

7.3.1.2 The protected areas linked to the surface water bodies within the Hornsea Three onshore cable corridor include drinking waters in the River Glaven and River Wensum, nitrate vulnerable zones (nutrient sensitive) in all river water bodies with the exception of the River Glaven, Urban Wastewater Treatment Directive nutrient sensitive areas in the River Wensum and the River Yare, Natura 2000 sites in the River Wensum, Blackwater Drain and the River Tud.

7.3.1.3 The surface water abstractions for drinking water purposes and also for irrigation are mapped within annex 2.3 Surface Water Abstraction Licences, Discharge Consents and Pollution Incidents. Any direct impact on the drinking water sources are avoided and with the mitigation strategy developed during the design of Hornsea Three (as laid out in the Outline CoCP (document reference A8.5)), the quality of the drinking water sources will not be compromised by Hornsea Three.

Table 7.1: Summary of mitigation measures to ensure the water body status does not deteriorate.

Activity	Biological supporting elements				Hydro-morphological supporting elements		Physico-chemical supporting elements	Chemical	
	Fish	Invertebrates	Macrophytes	Macrophytes and Phytobentos combined	Hydrological Regime	Morphology		Priority hazardous substances	Priority Substances
Preparation of temporary working corridor (See section 6.2 above for potential impact)	As outlined in section 6.2 the key impact from the preparation of the temporary working corridor is the potential for suspended sediment and the impacts that this can have on the above biological quality elements. The potential for the spread on invasive non-native species is also a significant risk. Measures will be set in place to minimise the potential for pollution from sediment deposition into watercourses and from works vehicles, including measures to prevent transfer of invasive plant or animal species between watercourses. The latter is particularly important to avoid risk to watercourses containing white clawed crayfish in the headwaters of the River Glaven. All construction work will be undertaken in accordance with good environmental practice based on legal responsibilities and guidance in accordance with the general overarching guidance on good environmental management. The Outline CoCP (document reference A8.5) and mitigation measures outlined in volume 3, chapter 2: Hydrology and Flood Risk and chapter 3: Ecology and Nature Conservation. As well as a series of supporting management plans such as the pollution prevention and emergency incident response plan and Ecological Management Plan (with biosecurity measures) will ensure that Hornsea Three will not result in a deterioration in the status of biological supporting elements using 2015 as the baseline status. Natural England recommended that it is very important that an invasive species protocol is included in the Environmental Statement. An invasive species protocol is included in the Outline CoCP. Surface water flowing into the cable trenches during the construction period will be pumped via settling tanks or ponds to remove sediment and potential contaminants, before being discharged into local ditches or drains via temporary interceptor drains.				In addition to the pollution prevention measures laid out in the Outline CoCP (document reference A8.5), preconstruction drainage will be installed either side of the Hornsea Three onshore cable corridor to ensure existing land drainage flow is maintained. This will ensure that drainage from the surrounding lands is not directed to the working corridor with only rainfall incident on the corridor collecting sediment laden water ensuring the volumes of water for treatment in advance of discharge is significantly reduced. These measures will ensure that significant sediment export to the existing drainage network and water courses will be avoided and will not result in a change to the channel form. Any field drainage intercepted during the cable installation will either be reinstated following the installation of the cable or diverted to a secondary channel through the installation of post construction drainage. Any works undertaken will be in agreement with the appropriate stakeholders. Disturbance to areas close to watercourses reduced to the minimum necessary for the work.	Oils and petroleum in particular from construction machinery used during the preparation of the Hornsea Three onshore cable corridor can have large impacts on aquatic species, and depending on the extent of a spill, may reduce respiration rates by altering oxygen exchange at the water-air interface or cause complete elimination of invertebrates and fish from streams. Refuelling of machinery used in the preparation of temporary working will be undertaken within designated areas where any spillages can be easily contained. Machinery will be routinely checked to ensure it is in good working condition (to reduce the risk of fuel/oil leaks) and should only be active when required. Any tanks and associated pipe work containing oils and fuels will be double skinned and be provided with intermediate leak detection equipment. The site waste management plan will incorporate a soil management strategy to ensure that recognised soil handling good practice is effectively implemented on site to minimise soil loss and damage/compaction. Surface water flowing into the cable trenches during the construction period will be pumped via settling tanks or ponds to remove sediment and potential contaminants, before being discharged into local ditches or drains via temporary interceptor drains.	Refuelling of machinery used in the preparation of the temporary working areas will be undertaken within designated areas where any spillages can be easily contained. Machinery will be routinely checked to ensure it is in good working condition (to reduce the risk of fuel/oil leaks) and should only be active when required. Any tanks and associated pipe work containing oils and fuels will be double skinned and be provided with intermediate leak detection equipment.	
Use of oils, chemicals and cement in the vicinity of open water (See section 6.3 above for potential impact)	Refuelling of machinery will be undertaken within designated areas where any spillages can be easily contained. Machinery will be routinely checked to ensure it is in good working condition (to reduce the risk of fuel/oil leaks) and should only be active when required. Any tanks and associated pipe work containing oils and fuels will be double skinned and be provided with intermediate leak detection equipment. Areas at risk of spillage, such as vehicle maintenance areas and hazardous substance stores (including fuel, oils and chemicals) to be bunded and carefully sited to minimise the risk of hazardous substances entering the drainage system or the local watercourses (e.g. no storage of oil within 50 m of a spring, well or borehole or within 10 m of a watercourse, or within areas at risk of flooding). Additionally, the bunded areas will have impermeable bases to limit the potential for migration of contaminants into groundwater following any leakage/spillage. Bunds used to store fuel, oil etc. to have a 110% capacity.				Scoped out.		As per biological supporting elements.	As per biological supporting elements.	

Activity	Biological supporting elements	Hydro-morphological supporting elements	Physico-chemical supporting elements	Chemical
Construction of HVAC booster station and HVDC converter/HVAC substation (See section 6.4 above for potential impact)	The construction stage risks to the biological quality elements will be addressed through the same measures outlined for the temporary working corridor above. Operational issues can pose a risk to the biological elements through the drainage of the low permeability surfaces of the onshore HVDC converter/HVAC substation and HVAC booster station. Operational practices incorporating measures to prevent pollution and increased flood risk, to include emergency spill response procedures, clean up and remediation of contaminated water runoff will be implemented.	The proposed development of the onshore HVDC converter/HVAC substation and HVAC booster station will result in the construction of low permeability surfacing, increasing the rate of surface water runoff from the site. A surface water drainage scheme is required to ensure the existing runoff rates to the surrounding water environment are maintained at pre- development rates as outlined in volume 3, chapter 2: Hydrology and Flood Risk.	As per biological supporting elements.	As per biological supporting elements.
Construction and operation of temporary bridges and culverts (See section 6.5 above for potential impact)	At sites where good quality substrate has been compacted (and after species rescue) due to flume placement and embedding, it is recommended that new clean sediment-free material of a similar grade be placed in the affected area after flume removal. In order to avoid direct impact on sensitive sites which have records of Crayfish (e.g. River Glaven, Wensum and Tud), HDD methods will be employed and access across the watercourse will be with temporary bridge. If sites of medium sensitivity or above for white clawed crayfish, require temporary bridging flumes be installed, crayfish recovery and translocation will be conducted prior to construction. Volume 3, chapter 3: Ecology and Nature Conservation includes a series of supporting management plans such as the pollution prevention and emergency incident response plan and Ecological Management Plan (with biosecurity measures) will ensure that Hornsea Three will not result in a deterioration in the status of biological supporting elements using 2015 as the baseline status.	Bridging will involve the construction of temporary bridge structures and the installation of bridge sections – these procedures will avoid any instream or immediate bank works to avoid any direct physical modification. The flume/culvert sections will be placed on the riverbed and adequately bedded down by pushing into the substrate to ensure that a suitable depth of water and flow velocity is maintained within the pipes to facilitate the upstream passage of fish. The length of each flumed section will be 6-8 m to allow an adequate running track for the movement of plant.	Minor release of sediment and other pollutants is possible due to plant activity in the riparian area. Plant working in close proximity to the water courses during the installation of these features will be managed carefully in accordance with the pollution prevention and emergency response plan. Refuelling of machinery used in the preparation of the temporary working will be undertaken within designated areas where any spillages can be easily contained. Machinery will be routinely checked to ensure it is in good working condition (to reduce the risk of fuel/oil leaks) and should only be active when required. Any tanks and associated pipe work containing oils and fuels will be double skinned and be provided with intermediate leak detection equipment.	Refuelling of machinery used in the preparation of the temporary working will be undertaken within designated areas where any spillages can be easily contained. Machinery will be routinely checked to ensure it is in good working condition (to reduce the risk of fuel/oil leaks) and should only be active when required. Any tanks and associated pipe work containing oils and fuels will be double skinned and be provided with intermediate leak detection equipment.

Activity	Biological supporting elements	Hydro-morphological supporting elements	Physico-chemical supporting elements	Chemical
Water course crossings (See section 6.6 above for potential impact)	The main rivers and in particular those of particular sensitivity e.g. River Wensum SAC (white clawed crayfish, brook lamprey and bullhead) will be traversed by HDD methods thereby avoiding direct impact. As set out in the Outline CoCP (document reference A8.5), method statements will be prepared for all main river crossings and an outlined method statement with the control measures to avoid significant impact of both open cut and trenchless crossings has been prepared and included as part of the Development Consent Order application. The Outline CoCP (document reference A8.5) includes measures to minimise risks associated with HDD including a protocol for dealing with bentonite breakout, which reduces risks to acceptable levels. Should these measures be employed the water course crossings should not result in a significant impact or deterioration in the baseline status.	HDD techniques will be employed on the main water course crossed by the project and assessed as part of the WFD compliance assessment (listed in Table 4.1). This will ensure that there will be no direct morphological impact on these surface water bodies for the purposes of WFD classification. For open cut crossings of small or less sensitive water courses the outline method statement for water course crossings outlines the different methods that can be used to install the cable. In all cases the cable will be installed in near dry conditions through the isolation of the section of channel in question. Once the cable is laid and the trench reinstated, the base of the watercourse bed will be consolidated. The cofferdam (or equivalent method) will be removed in a reverse procedure to that used for construction. Any works to ensure the integrity of the banks on either side of the watercourse will be undertaken. This may include geotextiles, reseeding/reinstatement of vegetation and placing of locally sourced stones.	As with all works in or near water the risk of sedimentation is key. The outline method statement for water course crossings and the Outline CoCP (document reference A8.5) outlines the methods of working, the pollution prevention measures, including approach to a bentonite breakout in the context of HDD crossings and how these will be managed to reduce the risks to acceptable levels. As per previous activities the use of oils/fuels will be managed in accordance with the pollution prevention plan and standard best practice so as to ensure the impact of this activity on the physico-chemical quality elements will not result in a deterioration in the baseline status.	As with all works in or near water the risk of sedimentation is key. The outline method statement for water course crossings and the Outline CoCP (document reference A8.5) outlines the methods of working, the pollution prevention measures, including approach to a bentonite breakout in the context of HDD crossings and how these will be managed to reduce the risks to acceptable levels. As per previous activities the use of oils/fuels will be managed in accordance with the pollution prevention plan and standard best practice so as to ensure the impact of this activity on the physico-chemical quality elements will not result in a deterioration in the baseline status.
Construction, operation and reinstatement of temporary access roads See section 6.7 above for potential impact	See preparation of temporary working corridor and water course crossings mitigation for similar impacts in terms of flume/culvert installation, sediment runoff. Should these measures be employed the impact will not be significant and there will be no deterioration in status across all the quality elements.			
Construction, operation and reinstatement of temporary compounds and storage areas (See section 6.8 above for potential impact)	The areas where secondary construction compounds will be located are typically currently in agricultural use so will not impact on any sensitive wetlands or water features. The measures outlined under the physico-chemical and chemical quality elements will ensure there is no risk of deterioration in the status of the biological elements through indirect pollutant pathways.	The main construction compound is located on a disused airfield with hard standing suitable for the temporary placement of site facilities. It will not directly impact on any water course or feature or alter the drainage characteristics of the site. Therefore it will not result in any hydromorphological impacts. Secondary compounds will be required during the construction for a period of 3 months for each phase. These sites have been identified (See Outline CoCP (document reference A8.5)) and will not impact directly on any watercourses. It is envisaged that each secondary construction compound will be constructed by laying a geotextile membrane or similar directly on top of the subsoil which will have stone spread over the top of it to a depth of approximately 400 mm (300 mm of 150 mm stone size c/w fine ballast and 100 mm of Type 1 clean stone. There will be no requirement to alter a water course nor will there be any formal drainage required at these locations. Due to their temporary nature, and given that they will be fully reinstated after construction, there will be no risk to the deterioration in the hydromorphological supporting elements.		As identified in the Outline CoCP (document reference A8.5) storage areas for fuels oils and chemicals will be located away from springs, boreholes, watercourses and areas at risk of flooding. Appropriate measures will be implemented to minimise the risk of hazardous substances entering the drainage system or the local watercourses (e.g. fuels, oils and chemicals will be stored in appropriately designed bunded areas of adequate capacity and with impermeable bases). Welfare facilities will ensure sewage generated from the main compound and secondary compounds will be disposed of in an appropriate manner and in accordance with the site waste management plan.
Operational and Maintenance phase (See section 6.9 above for	Operational practices within the onshore HVDC converter/HVAC substation and HVAC booster station will incorporate measures to prevent pollution including emergency spill response procedures, clean up and remediation of contaminated water runoff. The cable trenches themselves could provide a preferential flow	Scoped out – given the nature of the routine maintenance there should be no impact on the hydromorphology of the surface water bodies.	Operational practices within the onshore HVDC converter/HVAC substation and HVAC booster station will incorporate measures to prevent pollution including emergency spill response procedures, clean up and remediation of contaminated water runoff.	

Activity	Biological supporting elements	Hydro-morphological supporting elements	Physico-chemical supporting elements	Chemical
potential impact)	path to surface water and also result in wash out of the backfilling materials which could result in issues in the connected water courses. Measures such as hydraulic brakes will be installed, particularly in steeply sloping areas to ensure this does not occur.			
Decommissioning phase (See section 6.10 above for potential impact)	During decommissioning, the dismantling of the onshore HVDC converter/HVAC substation and the HVAC booster station will require the removal of the infrastructure which will require Heavy Goods Vehicles (HGVs) and possible temporary haul roads, compounds and storage areas. This could have an indirect impact on the biological supporting elements through has the potential to cause adverse impacts on surrounding watercourses and receptors through runoff and the use and storage of fuels and chemicals. The mitigation measures outlined for the construction stage will ensure this activity will not result in a deterioration in the status of the surface water bodies impacted by the onshore HVDC converter/HVAC substation and the HVAC booster station (River Bure and River Yare). Buried cables would be de-energized with the ends sealed and left in place to avoid ground disturbance.	Scoped out – there should be no further physical modification to water courses or the flow regime during the decommissioning phase.	During decommissioning, the dismantling of the onshore HVDC converter/HVAC substation and the HVAC booster station will require the removal of the infrastructure which will require HGVs and possible temporary haul roads, compounds and storage areas. This could have an indirect impact on the biological supporting elements through has the potential to cause adverse impacts on surrounding watercourses and receptors through runoff and the use and storage of fuels and chemicals. Similar mitigation measures outlined for the construction stage will be implemented to ensure this activity will not result in a deterioration in the status of the surface water bodies impacted by the onshore HVDC converter/HVAC substation and the HVAC booster station (River Bure and River Yare). Buried cables would be de-energized with the ends sealed and left in place to avoid ground disturbance.	

7.3.1.4 Nutrient sensitive areas have been designated under both the Nitrates Directive (Nitrate Vulnerable Zones) and the Urban Waste Water Treatment Directive (UWWTD) (sensitive areas). These designations are established to reduce the potential impacts from nutrients in the freshwater environment. The significant pressures associated with Hornsea Three are unlikely to impact on these designations. Nutrient export from the project will be limited with welfare facilities at the main compound and secondary compounds adequately managed through the site waste management plan. Particulate phosphorus export from sediment laden water will be adequately managed through soil management measures and pollution prevention measures to ensure no impact on the UWWTD sensitive areas within the River Wensum and River Yare.

7.3.1.5 Volume 3, chapter 3: Ecology and Nature Conservation has assessed the impacts of the Hornsea Three onshore construction on the Natura 2000 network and has concluded that there will not be a significant adverse impact on the conservation objectives of the Natura 2000 networks. No direct impacts on designated sites from cable installation will occur as HDD is being employed under all designated sites within the corridor, including the River Wensum SAC/Site of Special Scientific Interest (SSSI), Norfolk Valley Fens SAC/Booton Common SSSI. All significant watercourses and areas of woodland are also either avoided or crossed via HDDs. There is potential for a significant disturbance effect on pink-footed goose at the north end of the onshore cable corridor, where a significant percentage of the North Norfolk Coast SPA population has been recorded using sugar beet fields within or adjacent to the onshore cable corridor around Weybourne. The significance of this effect will be reduced via use of habitat manipulation to encourage the birds to settle on land outside the likely disturbance zone.

7.3.1.6 On this basis, the onshore elements of Hornsea Three will not result in the protected area objectives for the surface water bodies being impacted and therefore will not cause any deterioration in status or compromise the achievement of the objectives for the water bodies in question.

7.4 Achievement of the WFD objectives

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

7.4.1.2 Table 8.1 outlines the objectives for each water body crossed by Hornsea Three and the key quality elements driving the status. The Significant Water Management Issues (SWMI), where known, resulting in a status of less than good are summarised and the measures that are recommended in the RBMP to achieve the WFD objectives are identified. Currently none of the river water bodies are achieving good status and in some cases, as highlighted in Table 7.1, less stringent objectives will be necessary as certain water bodies are not predicted to be achieving good status by the end of the third river basin management cycle, (i.e. 2027). The final column of Table 8.1 assesses the potential impact on the achievement of the WFD objectives and concludes for all surface water bodies that Hornsea Three will not prevent the achievement of the WFD objectives.

8. Assessment Summary and Conclusion

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

8.1.1.2 The key focus of the assessment was to ensure that Hornsea Three does not result in a deterioration in the current WFD status based on the 2015 baseline as reported in the Anglican RBMP 2015-2021 and also to ensure that the project does not compromise the achievement of the WFD objectives for the improvement in the overall status of the surface water bodies which could be affected. The assessment also considered the protected areas linked to the surface water bodies in question and confirmed that the protected area objectives are also unaffected.

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

8.1.1.4 The overall conclusion of the WFD compliance assessment, based on the baseline information, the relevant impact assessments and mitigation strategy (documented in volume 1, chapter 3: Project Description and the Outline CoCP (document reference A8.5)), is that there will be no risk of deterioration in status or the prevention of the achievement of the objectives for the relevant surface water bodies nor will the protected area objectives be compromised.

Table 8.1: Significant Water Management Issues (SWMI), Source, Programme of measures, and assessment of the impact of the project on WFD objectives.

Water body affected (WFD Code)	Overall Status	Ecological Status	Chemical Status	Driving element for status classification	Significant Water Management Issue	Source Activity	RBMP Measures	WFD Objective	Do the onshore activities associated with Hornsea Three prevent the achievement of the WFD Objectives?
Glaven (GB105034055780)	Moderate	Moderate	Good	*Biology* - Macrophytes and phytobenthos	Nutrients (Phosphate)	Diffuse land use, predominantly arable	Control and manage diffuse source inputs. • Pathway – manage surface runoff and drainage management • Source – field and crop level measures – soil management.	Good 2027	The construction of the onshore elements of Hornsea Three could be undertaken over two phases as outlined in Table 4.1. If this is the case the River Glaven could have works ongoing up to 2027, which is the year when this water body is expected to achieve good status. The SWMI for this water body is phosphate levels in the water body and the source of the pressure is from diffuse agriculture. Measures have been recommended to ensure the achievement of the WFD objective. The construction of Hornsea Three will not prevent the implementation or effectiveness of these measures given the design mitigation proposed and the pollution prevention measures proposed.
Bure (upstream of confluence with Scarrow Beck) (GB105034055690)	Poor	Poor	Good	*Biology* – Fish	Morphological impacts • Barriers to fish migration • Arable land use and drainage	Sector • Domestic, general, public • Agriculture	• Removal or easement of barriers to fish migration. • Improvement to condition of channel/bed and/or banks/shoreline.	Poor 20125 Poor 2021 Good 2027	The measures that are proposed in order to achieve good status by 2027 will not be impacted by Hornsea Three. The hydrological characterisation study has not identified any barriers to fish migration (weirs or culverts) in the vicinity of the proposed crossing point and there will be no requirement to culvert or flume the watercourse for the haul route thereby avoiding any direct impact on the River but also ensuring that measures to improve the connectivity of the river are not hindered.
Swannington Beck (GB105034051070)	Good	Poor	Good	*Biology* - Fish	Morphological Impacts • Land drainage – operational management • Flood protection – sediment management	Not specified as certainty not confirmed	• Increase in-channel morphological diversity. • Enable fish passage.	Good 2015	The fish status for this river is currently classified as poor, however the overall status is considered to be good. Hornsea Three will not compromise the implementation of the measures put forward for the improvement of fish status due to the design mitigation for this river crossing which will be undertaken by HDD methods. Controls for sediment management and prevention of sediment loading to surface water bodies will ensure that the efforts to improve in-channel morphology will not be impacted.
Blackwater Drain (GB105034051120)	Moderate	Moderate	Good	*Biology* - Macoinvertebrates, *Physico-chemical* - Dissolved oxygen	Land drainage – operational management	Agriculture and rural land management	• Improve modified habitat. • Improvement in the condition of riparian zone/wetland habitats. • Habitat Improvement Wensum Tributaries.	Good 2021	As is outlined in Table 5.2 the measures to achieve the objective of 2021 have not yet been fully implemented. Whilst this crossing is proposed to be a HDD the hydrological characterisation study has established that access will be required across the watercourse through the cable corridor through the culverting or bridging of the watercourse. The phasing of the project means that the construction work will most likely commence after the 2021 objective of good status, however any disturbance resulting from the haul route crossing can be mitigated through the River Wensum Restoration Strategy and ensure the Good 2021 objective is not compromised by Hornsea Three.

Water body affected (WFD Code)	Overall Status	Ecological Status	Chemical Status	Driving element for status classification	Significant Water Management Issue	Source Activity	RBMP Measures	WFD Objective	Do the onshore activities associated with Hornsea Three prevent the achievement of the WFD Objectives?
Wensum US Norwich (GB105034055881)	Moderate	Moderate	Good	*Biology* - Macrophytes and phytobenthos *Hydromorphological* – hydrological regime	Nutrients (phosphate) Hydrological regime	Urban Wastewater Treatment Surface Water Abstraction (water industry and agriculture)	Change abstraction location	Moderate 2015 Moderate 2021 Moderate 2027	The mitigation measures have not yet been implemented however Hornsea Three will not impact upon the implementation of these measures nor will it affect their effectiveness. The crossing of the Wensum will be undertaken by a HDD set well back from the sensitive habitats (a drill shot of 400 m). The design mitigation as summarised in Table 7.1 and detailed in the Outline CoCP (document reference A8.5), will ensure that the construction and operation of Hornsea Three project elements will not compromise the achievement of the WFD objective for this water body.
Tud (GB105034051000)	Moderate	Moderate	Good	*Physico-chemical* - Phosphate	Urban Wastewater Treatment (Sewage) Discharge	Water Industry	Upgrade private sewage installations	Moderate 2015 Moderate 2021 Moderate 2027	This is a point source pressure and the hydrological characterisation study has identified two domestic sewage consents downstream of the proposed crossing points. The construction and operation of Hornsea Three will not impact on the measures proposed to improve the status of this water body albeit post 2027 good status objective.
Yare (Tiffey to Wensum) (GB105034051281)	Moderate	Moderate	Good	*Biology* - Macrophytes and phytobenthos *Hydromorphological* – Hydrological regime	• Urban Pollution – sediment issues from transport e.g. impacts of vehicles on road verges, road drainage. • Surface water abstraction impacting on hydrological regime	Transport sector Water Industry	Water industry investment programme to prevent entrainment of eels in abstraction	Moderate 2021 Good 2027	The mitigation assessment has established that not all the measures are in place as yet but are programmed to be in place by 2021, most likely in advance of construction. The project will not impact on measures to improve the hydrological regime and in particular the impact of the abstraction on eel entrainment and therefore will not prevent the WFD objective for the hydrological regime from being achieved. Urban pollution from transport networks is an issue in this water body and erosion of roadside verges is something that is causing sediment pressures which are contributing to the moderate macrophytes and phytobenthos status. Careful traffic management and haul route delineation will ensure that construction traffic will use appropriate routes of adequate width to ensure roadside verges are not unduly affected or damaged. These measures are set out in the Outline CoCP (document reference A8.5).
Intwood Stream (GB105034051240)	Moderate	Moderate	Good	*Physico-chemical* - Phosphate	Urban Wastewater Treatment (Sewage) Discharge	Water Industry	Upgrade private sewage installations	Moderate 2015 Moderate 2021 Moderate 2027	The SWMIs in this water body relate to private sewage facilities which will require upgrade. The Hornsea Three onshore project will not affect the implementation or effectiveness of this measure and will therefore not prevent the achievement of the WFD objective.
Tas (Tasburgh to River Yare) (GB105034051230	Moderate	Moderate	Good	*Physico-chemical* - Phosphate	Urban Wastewater Treatment (Sewage) Discharge	Water Industry	Upgrade private sewage installations	Moderate 2015 Moderate 2021 Moderate 2027	There are watercourses directly affected by the project in this water body catchment. The SWMIs in this water body relate to private sewage facilities which will require upgrade. Hornsea Three will not affect the implementation or effectiveness of this measure and will therefore not prevent the achievement of the WFD objective.

9. References

Catchment data explorer (http://environment.data.gov.uk/catchment-planning/)

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

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Environment Agency (2016) Part 1: Anglian river basin district River basin management plan Updated: December 2015. Environment Agency, Bristol.

Appendix A Surface water body classification tables

Glaven River Quality Element	Current Status (2016)
Overall	Moderate
Ecological	Moderate
Biological quality elements	Moderate
Fish	Good
Invertebrates	High
Macrophytes and Phytobenthos Combined	Moderate
Hydromorphological Supporting Elements	Supports Good
Hydrological Regime	Supports Good
Morphology	Supports Good
Physico-chemical quality elements	High
Ammonia (Phys-Chem)	High
Dissolved oxygen	High
pH	High
Phosphate	High
Temperature	High
Chemical	Good
Other Pollutants	Does not require assessment
Priority hazardous substances	Does not require assessment
Priority substances	Does not require assessment

Bure River (u/s confluence with Scarrow Beck) Quality Element	Current Status (2016)
Overall Water Body	Poor
Ecological	Poor
Biological quality elements	Poor
Fish	Poor
Invertebrates	High
Macrophytes and Phytopenthos combined	Moderate

Bure River (u/s confluence with Scarrow Beck) Quality Element	Current Status (2016)
Hydromorphological Supporting Elements	Supports Good
Hydrological Regime	Supports Good
Morphology	Supports Good
Physico-chemical quality elements	Good
Ammonia (Phys-Chem)	High
Biochemical Oxygen Demand (BOD)	High
Dissolved oxygen	Good
pH	High
Phosphate	Good
Temperature	High
Specific pollutants	High
Ammonia (Annex 8)	High
Copper	High
Iron	High
Triclosan	High
Zinc	High
Supporting elements (Surface Water)	-
Chemical	Good
Other Pollutants	Does not require assessment
Priority hazardous substances	Does not require assessment
Priority substances	Does not require assessment

Blackwater Drain (GB105034051120) Quality Element	Current Status (2016)
Overall Water Body	Moderate
Ecological	Moderate
Biological quality elements	Moderate
Fish	Good

Blackwater Drain (GB105034051120) Quality Element	Current Status (2016)
Invertebrates	Moderate
Hydromorphological Supporting Elements	Supports Good
Hydrological Regime	Supports Good
Physico-chemical quality elements	Moderate
Ammonia (Phys-Chem)	High
Dissolved oxygen	Moderate
pH	High
Phosphate	High
Temperature	High
Supporting elements (Surface Water)	Moderate
Mitigation Measures Assessment	Moderate or less
Chemical	Good
Other Pollutants	Does not require assessment
Priority hazardous substances	Does not require assessment
Priority substances	Does not require assessment

Swannington Beck Quality Element	Current Status (2016)
Overall Water Body	Good
Ecological	Good
Biological quality elements	Poor
Fish	Poor
Invertebrates	High
Hydromorphological Supporting Elements	Supports Good
Hydrological Regime	High
Physico-chemical quality elements	Good
Ammonia (Phys-Chem)	High
Dissolved oxygen	Good

Swannington Beck Quality Element	Current Status (2016)
pH	High
Phosphate	High
Temperature	High
Supporting elements (Surface Water)	Good
Mitigation Measures Assessment	Good
Chemical	Good
Other Pollutants	Does not require assessment
Priority hazardous substances	Does not require assessment
Priority substances	Does not require assessment

Wensum US Norwich Quality Element	Current Status (2016)
Overall Water Body	Moderate
Ecological	Moderate
Biological quality elements	Moderate
Fish	Good
Invertebrates	High
Macrophytes and Phytobenthos Combined	Moderate
Hydromorphological Supporting Elements	Supports Good
Hydrological Regime	Does Not Support Good
Physico-chemical quality elements	Good
Ammonia (Phys-Chem)	High
Biochemical Oxygen Demand (BOD)	High
Dissolved oxygen	High
pH	High
Phosphate	High
Temperature	Good
Specific pollutants	High

Wensum US Norwich Quality Element	Current Status (2016)
Arsenic	High
Copper	High
Iron	High
Zinc	High
Supporting elements (Surface Water)	Moderate
Mitigation Measures Assessment	Moderate or less
Chemical	Good
Other Pollutants	Does not require assessment
Priority hazardous substances	Good
Cadmium and Its Compounds	Good
Priority substances	Good
Lead and Its Compounds	Good
Nickel and Its Compounds	Good

River Tud Quality Element	Current Status (2016)
Overall Water Body	Moderate
Ecological	Moderate
Biological quality elements	Good
Fish	Good
Invertebrates	High
Hydromorphological Supporting Elements	Supports Good
Hydrological Regime	Supports Good
Physico-chemical quality elements	Moderate
Ammonia (Phys-Chem)	High
Dissolved oxygen	Good
pH	High
Phosphate	Moderate

River Tud Quality Element	Current Status (2016)
Temperature	High
Supporting elements (Surface Water)	Good
Mitigation Measures Assessment	Good
Chemical	Good
Other Pollutants	Does not require assessment
Priority hazardous substances	Does not require assessment
Priority substances	Does not require assessment

Yare (Tiffey to Wensum) Quality Element	Current Status (2016)
Overall Water Body	Moderate
Ecological	Moderate
Biological quality elements	Moderate
Fish	Good
Invertebrates	High
Macrophytes and Phytobenthos Combined	Moderate
Hydromorphological Supporting Elements	Supports Good
Hydrological Regime	Does Not Support Good
Physico-chemical quality elements	Good
Acid Neutralising Capacity	High
Ammonia (Phys-Chem)	High
Dissolved oxygen	Good
pH	High
Phosphate	Good
Temperature	High
Specific pollutants	High
2,4-dichlorophenoxyacetic acid	High
Carbendazim	High

Yare (Tiffey to Wensum) Quality Element	Current Status (2016)
Copper	High
Diazinon	High
Dimethoate	High
Linuron	High
Mecoprop	High
Supporting elements (Surface Water)	Moderate
Mitigation Measures Assessment	Moderate or less
Chemical	Good
Other Pollutants	Does not require assessment
Priority hazardous substances	Does not require assessment
Priority substances	Good
Atrazine	Good
Chlorfenvinphos	Good
Chlorpyrifos (Priority)	Good
Diuron	Good
Isoproturon	Good
Simazine	Good

Yare (u/s confluence with Tiffey - Lower) Quality Element	Current Status (2016)
Overall Water Body	Poor
Ecological	Poor
Biological quality elements	Poor
Fish	Poor
Invertebrates	High
Macrophytes and Phytobenthos Combined	Moderate
Hydromorphological Supporting Elements	Supports Good
Hydrological Regime	Supports Good

Yare (u/s confluence with Tiffey - Lower) Quality Element	Current Status (2016)
Morphology	Supports Good
Physico-chemical quality elements	Good
Ammonia (Phys-Chem)	High
Dissolved oxygen	High
pH	High
Phosphate	Good
Temperature	High
Chemical	Good
Other Pollutants	Does not require assessment
Priority hazardous substances	Does not require assessment
Priority substances	Does not require assessment

Intwood Stream Quality Element	Current Status (2016)
Overall Water Body	Moderate
Ecological	Moderate
Biological quality elements	Good
Invertebrates	Good
Macrophytes and Phytobenthos Combined	High
Hydromorphological Supporting Elements	Supports Good
Hydrological Regime	Supports Good
Physico-chemical quality elements	Moderate
Ammonia (Phys-Chem)	High
Dissolved oxygen	High
pH	High
Phosphate	Poor
Temperature	High
Supporting elements (Surface Water)	Good

Intwood Stream Quality Element	Current Status (2016)
Mitigation Measures Assessment	Good
Chemical	Good
Other Pollutants	Does not require assessment
Priority hazardous substances	Does not require assessment
Priority substances	Does not require assessment

River Tas (Tasburgh to R. Yare) Quality Element	Current Status (2016)
Overall Water Body	Moderate
Ecological	Moderate
Biological quality elements	Good
Fish	Good
Invertebrates	High
Hydromorphological Supporting Elements	Supports Good
Hydrological Regime	Supports Good
Physico-chemical quality elements	Moderate
Ammonia (Phys-Chem)	High
Dissolved oxygen	Good
pH	High
Phosphate	Moderate
Temperature	High
Supporting elements (Surface Water)	Good
Mitigation Measures Assessment	Good
Chemical	Good
Other Pollutants	Does not require assessment
Priority hazardous substances	Does not require assessment
Priority substances	Does not require assessment

Norfolk North Coastal Water Body Quality Element	Current Status (2016)
Overall Water Body	Moderate
Ecological	Moderate
Biological quality elements	Good
Angiosperms	Good
Invertebrates	Good
Phytoplankton	Good
Physico-chemical quality elements	Moderate
Dissolved Inorganic Nitrogen	Moderate
Dissolved oxygen	High
Specific pollutants	High
Arsenic	High
Copper	High
Zinc	High
Supporting elements (Surface Water)	Good
Mitigation Measures Assessment	Good
Chemical	Good
Other Pollutants	Good
Aldrin, Dieldrin, Endrin & Isodrin	Good
DDT Total	Good
para - para DDT	Good
Priority hazardous substances	Good
Cadmium and Its Compounds	Good
Hexachlorocyclohexane	Good
Mercury and Its Compounds	Good
Priority substances	Good
Lead and Its Compounds	Good
Nickel and Its Compounds	Good

Norfolk East Coastal Water Body Quality Element	Current Status (2016)
Overall Water Body	Moderate
Ecological	Moderate
Biological quality elements	Good
Phytoplankton	Good
Physico-chemical quality elements	Moderate
Dissolved Inorganic Nitrogen	Moderate
Dissolved oxygen	High
Specific pollutants	High
Toluene	High
Supporting elements (Surface Water)	Good
Mitigation Measures Assessment	Good
Chemical	Good
Other Pollutants	Does not require assessment
Priority hazardous substances	Does not require assessment
Priority substances	Good
Benzene	Good