Liverpool Bay CCS Ltd
HYNET CARBON DIOXIDE TRANSPORTATION AND STORAGE PROJECT - OFFSHORE

Environmental Statement
Volume 3, Appendix Q: WFD Assessment

EHE7228B
Liverpool Bay CCS Limited
Version Final
February 2024
Offshore ES
WFD Assessment

rpsgroup.com

Document status					
Version	**Purpose of document**	**Authored by**	**Reviewed by**	**Approved by**	**Date**
FINAL	Final	RPS	RPS	ENI	February 2024

Prepared by:

RPS

Prepared for:

Liverpool Bay CCS Limited

Glossary

Term	Meaning
The Applicant	This is Liverpool Bay CCS Ltd, the entity making the application and the entity that ultimately develops/operates the HyNet Carbon Dioxide Transportation and Storage System.
Bathing Waters	Originally designated under the EU Bathing Waters Directive (2006/7/EC), this indicates sites at which there is no permanent advice against bathing, based on water quality indicators.
Cefas Action Level 1	Measure of concentrations of metallic and organic contaminants within the marine environment, with concentrations above these levels requiring mitigation actions in some capacity.
Environmental Impact Assessment	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an Environmental Statement (ES).
Hydromorphology	The physical characteristics of the waterbody including the size, shape, structure and the flow and quantity of water and sediment.
Intertidal area	The area between Mean High Water Springs (MHWS) and Mean Low Water Springs (MLWS).
Landfall	The area in which the offshore export cables make contact with land and the transitional area where the offshore cabling connects to the onshore cabling.
Marine Conservation Zone	Areas protected based on the presence of nationally important, rare, or threatened species or habitats.
Marine Pollution Contingency Plan	Plan required in licenced marine activities detailing specific best practice responses to any potential identified chemical or physical pollution event.
Maximum design scenario	The scenario within the project design envelope with the potential to result in the greatest impact on a particular topic receptor, and therefore the one that should be assessed for that topic receptor.
Mitigation Measure	Measure which would avoid, reduce, or remediate an impact
Natural Resources Wales Cycles 2/3	Datasets collated concerning quality indicators in Wales water bodies, with targets set for the implementation of the Water Framework Directive.
Non-statutory stakeholder	Organisations with whom the regulatory authorities may choose to engage who are not designated in law but are likely to have an interest in a proposed development.
Project Design Envelope	Also known as the Rochdale Envelope, the PDE concept is routinely utilised in both onshore and offshore planning applications to allow for some flexibility in design options, particularly offshore, and more particularly for foundations and turbine type, where the full details of the project are not known at application submission but where sufficient detail is available to enable all environmental impacts to be appropriately considered during the EIA.
Surface Water Body	Any body of water above ground, including streams, rivers, lakes, wetlands, reservoirs, and creeks.
Transitional Waters	Waters with variable salinity between the land and the sea including fjords, estuaries, lagoons, deltas and rias.
Water Framework Directive	European Union legislation under which Great Britain is obliged to meet targets for the ecological and chemical status of waterbodies over the course of the next 15 years.

Acronyms and Initialisations

Acronym and Initialisations	Description
AEoI	Adverse Effect on Integrity
BP	Biosecurity Plan
CBRA	Cable Burial Risk Assessment

Acronym and Initialisations	Description
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CMS	Construction Method Statement
CSIP	Cable Specification and Installation Plan
DO	Dissolved Oxygen
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EQSD	Environmental Quality Standards Directive
EU	European Union
FLCP	Fisheries Liaison and Coexistence Plan
FLO	Fisheries Liaison Officer
FO	Fibre optic
HDD	Horizontal Directional Drilling
INNS	Invasive Non-Native Species
LSE	Likely Significant Effect
MARPOL	International Convention for the Prevention of Pollution from Ships
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMMP	Marine Mammal Mitigation Protocol
MPCP	Marine Pollution Contingency Plan
NRW	Natural Resources Wales
NVZ	Nitrate Vulnerable Zone
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
PDE	Project Design Envelope
PLONOR	Poses Little or No Risk
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SPA	Special Protection Area
SSC	Suspended Sediment Concentration
UXO	Unexploded Ordnance
WFD	Water Framework Directive
ZOI	Zone of Influence

Units

Unit	Description
km	Kilometre
km^2	Square kilometre
m	Metre
m^2	Square metre
nm	Nautical Mile
%	Percent

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1 WFD ASSESSMENT TECHNICAL REPORT

1.1 Introduction

This Water Framework Directive (Council Directive 2000/60/EC establishing a framework for community action in the field of water policy) (WFD) coastal and transitional waters assessment Technical Report (hereafter 'WFD assessment') provides a WFD screening, scoping and assessment of effects for the HyNet Carbon Dioxide Transportation and Storage Project – Offshore (hereafter referred to as 'the Proposed Development) against the objectives for the WFD water bodies relevant to the Proposed Development. It has described the current baseline conditions and quantified the potential changes due to the installation and presence of the Proposed Development, which is illustrated in Figure 1.1 and described in detail in section 1.4.

The WFD was adopted by the European Commission in December 2000 and was transposed into law in England and Wales by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the 2017 Regulations). The WFD is retained EU legislation and is applicable in England and Wales as set out in sections 2 and 3 of the European Union (Withdrawal) Act 2018 and the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019.

The WFD applies to all water bodies, including those that are both natural and man made. Under the WFD, coastal waters, estuaries, rivers, man made docks and canals are divided into a series of water bodies, and within each water body, the WFD sets ecological and chemical objectives. The aim of the WFD was for all water bodies to achieve 'good' status by 2015. This aim was not achieved and therefore the Environment Agency subsequently aimed to achieve 'good' status in at least 60% of waters by 2021[1] and in as many waters as possible by 2027. Under all conditions, it requires that there should be no deterioration in status.

Whilst Environmental Impact Assessment (EIA) is an efficient mechanism to gather the relevant information for WFD compliance assessment, it needs to be interpreted in relation to the WFD objectives. According to the '*Clearing the Waters for All*' guidance (Environment Agency, 2017), impacts on 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 (Environment Agency, 2017). Therefore, this WFD assessment has been undertaken to assess the potential impact of the Proposed Development on WFD transitional and coastal receptors out to 1 nm, as advised in '*Clearing the Waters for All*'.

This WFD assessment has considered the different activities associated with the Proposed Development in the context of the environmental objectives of any affected WFD coastal or transitional water body out to 1nm. WFD compliance of onshore infrastructure has been assessed and presented as part of the HyNet Project Onshore application WFD assessment (See T4 Volume III Appendix 18.3 available at: Citizen Portal Planning (agileapplications.co.uk)). The compliance assessment has also provided the opportunity to inform the detailed design of the Proposed Development to avoid, minimise, mitigate or compensate for the risks to the environmental objectives of WFD surface water receptors where the risk assessment determined that the activities have the potential to:

- cause a surface water body to deteriorate from one WFD status class to another or cause significant localised impacts that could contribute to this happening; and
- 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] By the 2021 update, 36% of surface water bodies in the UK were assessed as being of 'good' or 'high' status (JNCC, 2022).

The '*Clearing the Waters for All*' guidance, the Planning Inspectorate 'Advice Note 18: Water Framework Directive' (Planning Inspectorate, 2017) and the relevant chapters of the Offshore ES for the Proposed Development, have been used to inform the screening, scoping and assessment of the potential for the Proposed Development to have a significant non temporary effect on WFD parameters at water body level. This has been undertaken on the basis of the Proposed Development information detailed within the Offshore ES at volume 1, chapter 3. Temporary effects of the Proposed Development have been included for assessment although it is noted in the '*Clearing the Waters for All*' guidance that these are not considered to constitute a deterioration in WFD status (Environment Agency, 2017).

This WFD assessment should be read alongside the following chapters of the Offshore ES for the Proposed Development:

- volume 2, chapter 6;
- volume 2, chapter 7;
- volume 3, appendix H; and
- volume 3, appendix I.

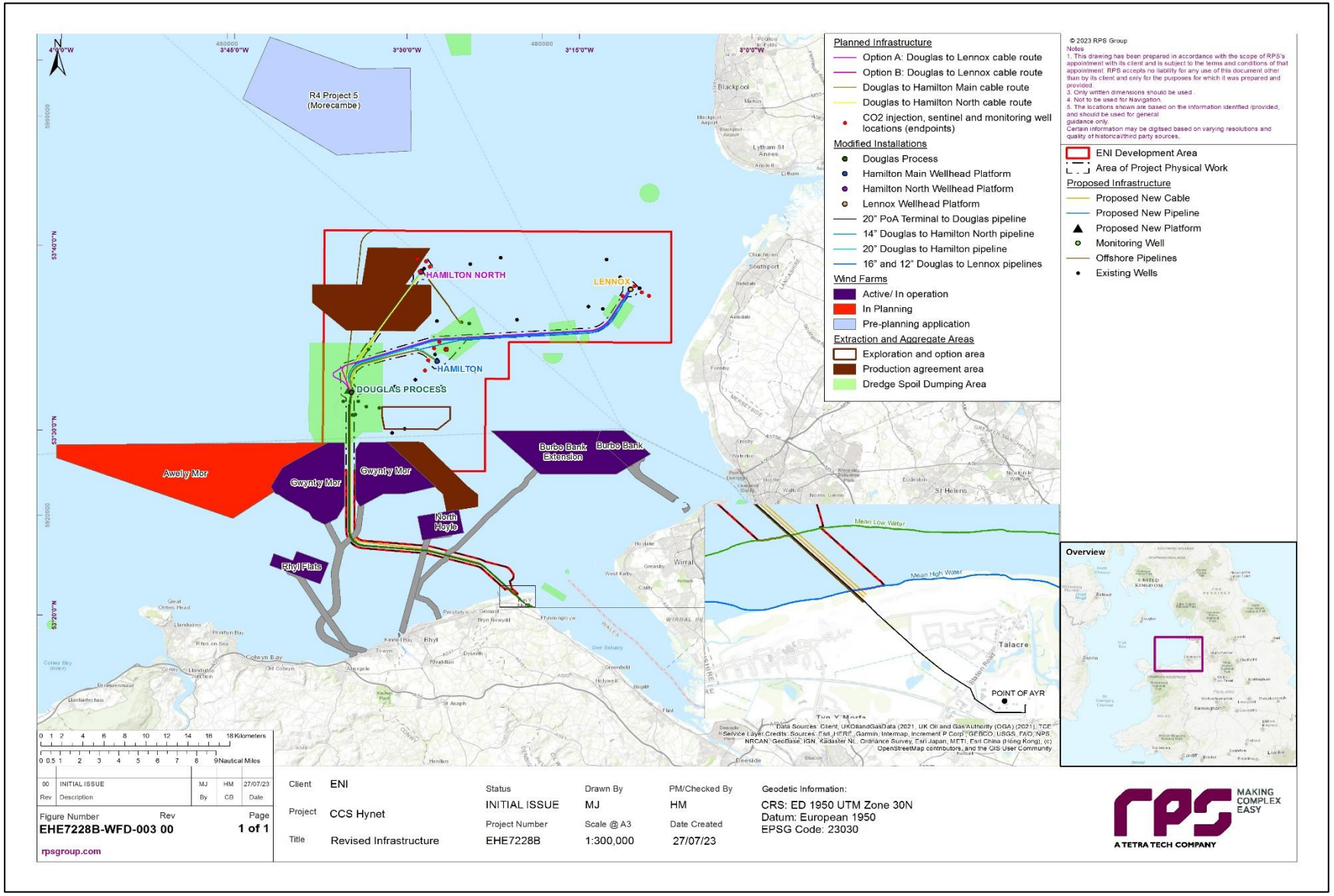

Figure 1.1: Overview of Location and Infrastructure Associated with the Proposed Development and Relationship to Third Party Infrastructure

1.2 Consultation

A summary of the key issues raised during consultation activities undertaken to date relevant to the WFD Assessment is presented in Table 1.1 below.

Table 1.1: Summary of Key Consultation Issues Raised During Consultation Activities Undertaken for the Proposed Development Relevant to WFD Assessment

Date	Consultee and type of response	Issues raised	How comments have been addressed
27 January 2023	Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) – Scoping Opinion. Annex 1, Section 3, Subsection: Marine Water and Sediment Quality and WFD.	"*Increases in suspended sediment concentrations (SSC) during construction and operation of the Project (e.g. future dredging work) have the potential to smother sensitive habitats. It is therefore advised that the ES includes information on the sediment quality and the potential for any effects on water quality through suspension of contaminated sediments. The ES should also consider whether increased SSC have the potential to impact upon interest features and supporting habitats of any designated sites*."	The potential for increased SSC to affect sensitive habitats is considered in the 'water quality' scoping sections for the relevant water bodies (Table 1.14 and Table 1.23) and is assessed in section 1.8.1.
27 January 2023	OPRED – Scoping Opinion. Annex 1, Section 3, Subsection: Marine Water and Sediment Quality and WFD.	"*The following potential impact pathways for marine water and sediment quality which are not currently scoped in but which will require further consideration have been identified: bacterial release from sediments due to the proximity of designated bathing and shellfish waters; pipeline contents temperature effects; and impacts to Dissolved Oxygen and Phytoplankton as a result of elevated suspended sediment concentrations*."	Potential effects to bathing waters and shellfish water are considered in the 'protected areas' sections for each water body (Table 1.18 and Table 1.26) and is assessed in section 1.8.2. The potential for increased SSC to affect dissolved oxygen and phytoplankton s is considered in the 'water quality' scoping sections for the relevant water bodies (Table 1.15 and Table 1.23) and is assessed in section 1.8.1
27 January 2023	OPRED – Scoping Opinion. Annex 1, Section 3, Subsection: Marine Water and Sediment Quality and WFD.	"*Should trenching take place in the intertidal area, it is advised that bacterial release from sediments is assessed due to the potential proximity to designated bathing and shellfish waters.*"	Potential effects to bathing waters and shellfish water from potential bacterial release are considered in the 'protected areas' sections for each water body (Table 1.18 and Table 1.26) and is assessed in section 1.8.2.

Date	Consultee and type of response	Issues raised	How comments have been addressed
27 January 2023	OPRED – Scoping Opinion. Annex 1, Section 3, Subsection: Marine Water and Sediment Quality and WFD.	"*Potential increased temperature effects from the pipeline contents should be considered as part of the marine water and sediment quality assessment.*"	The potential effects of temperature change due to pipeline contents s is considered in the 'water quality' scoping sections for the relevant water bodies (Table 1.15 and Table 1.23) and is assessed in section 1.8.1
27 January 2023	OPRED – Scoping Opinion. Annex 1, Section 3, Subsection: Marine Water and Sediment Quality and WFD.	"*As a result of elevated suspended sediment concentration as a result of the activities it is advised that impacts to dissolved oxygen (DO) and phytoplankton are assessed.*"	The potential for increased SSC to affect dissolved oxygen and phytoplankton s is considered in the 'water quality' scoping sections for the relevant water bodies (Table 1.15 and Table 1.23) and is assessed in section 1.8.1
27 January 2023	OPRED – Scoping Opinion. Annex 1, Section 3, Subsection: Marine Water and Sediment Quality and WFD.	"*Whilst water quality is incorporated into the physical processes heading, the mitigation measures associated with water quality have not been clearly outlined. It is recommended that mitigation measures such as the Code of Construction Practice, Environmental Management Plan and Marine Pollution Contingency Plan are included, although it is noted that two of these are included elsewhere in Section 5.3.3.2: Mitigation Measures - Tertiary Inexorable Mitigation.*"	Measures proposed to be adopted as part of the Proposed Development are presented in section 1.4.5.
27 January 2023	OPRED – Scoping Opinion. Annex 1, Section 3, Subsection: Marine Water and Sediment Quality and WFD.	"*It is advised that contaminated sediment concentrations are compared to the Centre for the Environment, Fisheries and Aquaculture Science (CEFAS) action levels, and that further sampling may be required at the landfall location to assess the potential of bacterial release from the sediment*."	Potential for sediment contamination is considered in the 'water quality' sections for the relevant water bodies, and WFD requirements state that these should not exceed Cefas Action Level 1 concentrations. Details are presented in Table 1.16 and Table 1.24.
27 January 2023	OPRED – Scoping Opinion. Annex 1, Section 3, Subsection: Marine Water and Sediment Quality and WFD.	"*Since the UK has left the European Union, Section 2.5.2: The Water Framework Directive (WFD) Regulations, should make reference to the Water Environment Regulations. It is recommended that the Environment Agency's "Clearing the Waters for All" WFD guidance is consulted as it forms a useful basis for*	This WFD compliance assessment has followed the approach and structure outlined in the '*Clearing the Waters for All*' guidance (Environment Agency, 2017), with scoping following the template referenced therein (Environment Agency, 2016a). The Water

Date	Consultee and type of response	Issues raised	How comments have been addressed
		performing a WFD assessment."	Environment Regulations are discussed in section 1.1.
13 December 2023	Natural Resources Wales	"*The impacts of the proposal to the whole Waterbody should be considered, not only to the 1 nm limit. The WFD compliance assessment should be undertaken to 1 nm for ecological status and to the limit of territorial waters (12 nm) for chemical status.*"	Assessment of chemical status considers the results of sediment sampling out to 12 nm, and the potential effects to the whole North Wales water body. Additional consideration to disturbance of contaminated sediment from historical industry and oil and gas extraction has been given in sections 1.5, 1.6.2, 1.7.3.4, 1.7.4.4 and 1.8.1. Consideration of sensitive habitats throughout the relevant waterbodies is presented in Table 1.12, Table 1.13 and Table 1.21

1.3 Data sources

Information to inform the WFD coastal waters and transitional waters assessment within the WFD coastal waters assessment Study Area was collected through a detailed desktop review of existing studies and datasets. These are summarised in Table 1.2 below.

Table 1.2: Summary of Key Desktop Reports

Title	Source	Year	Author
RBMP Measures and Objectives data July 2022	https://cyfoethnaturiolcymru.sharefile.eu/share/view/sc0c2a20ae9c2429394326eb75e0eda5d	2023	NRW
2023 Bathing Water Profile for Prestatyn	https://environment.data.gov.uk/wales/bathing-waters/profiles/profile.html?site=ukl1302-40700	2023	NRW
Offshore Chemical Notification Scheme (OCNS) Definitive ranked list of registered products	https://www.cefas.co.uk/data-and-publications/ocns/	2022	Cefas
JNCC MPA Mapper	https://jncc.gov.uk/mpa-mapper/	2022	JNCC
Water Watch Wales: Cycle 3 (2021) Web Mapping Application	https://waterwatchwales.naturalresourceswales.gov.uk/en/	2022	NRW
Dee River Basin Management Plan 2021 – 2027 Summary	https://cdn.cyfoethnaturiol.cymru/media/695219/dee-rbmp-2021_2027-summary.pdf	2022	NRW
Western Wales River Basin Management Plan 2021-2027 Summary	https://cdn.cyfoethnaturiol.cymru/media/695227/western-wales-rbmp-2021_2027-summary.pdf	2022	NRW
Heavily Modified Uses and Mitigation Measures July 2022	https://cyfoethnaturiolcymru.sharefile.eu/share/view/sdde43d782ae54702ad52b189cadcd827	2022	NRW
Reason for not achieving good Cycle 3 October 2022	https://cyfoethnaturiolcymru.sharefile.eu/share/view/s11466c27806c4fccb29ba4c6900cc3a1	2022	NRW

Title	Source	Year	Author
River basin planning: progress report	https://www.gov.uk/government/publications/river-basin-planning-progress-report/river-basin-planning-progress-report	2021	Environment Agency
2021 Cycle 3 Classification Data	https://cyfoethnaturiolcymru.sharefile.eu/d-sc8f1ea840a594d32a5ac24f3aa3c2350	2021	NRW
List of Substances Used and Discharged Offshore which Are Considered to Pose Little or No Risk to the Environment	https://www.ospar.org/documents?d=32939	2021	OSPAR
Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019	https://www.legislation.gov.uk/uksi/2019/579/contents/made	2019	UK Government
'Clearing the Waters for All' Guidance. Water Framework assessment: estuarine and coastal waters	https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters	2017	Environment Agency
Advice note eighteen: The Water Framework Directive	https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-18/	2017	Planning Inspectorate
Water Environment Water Framework Directive) (England and Wales) Regulations 2017	https://www.legislation.gov.uk/uksi/2017/407/contents/made	2017	UK Government
Water Framework Directive assessment: scoping template for activities in estuarine and coastal waters	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/577892/wfd_scoping_template.odt	2016a	Environment Agency
Environmental Quality Standards Directive (EQSD) list for WFD assessments	https://www.gov.uk/government/publications/list-of-chemicals-for-water-framework-directive-assessments/environmental-quality-standards-directive-eqsd-list-for-wfd-assessments	2016	Environment Agency
The Bathing Water Regulations 2013	https://www.legislation.gov.uk/uksi/2013/1675/made	2013	UK Government
Council Directive 2000/60/EC establishing a framework for community action in the field of water policy	https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2000:327:FULL	2000	European Parliament and the Council of the European Union
The Urban Waste Water Treatment (England and Wales) Regulations 1994	https://www.legislation.gov.uk/uksi/1994/2841/made	1994	UK Government
Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat	https://ramsar.org/sites/default/files/documents/library/current_convention_text_e.pdf	1971 (UK ratified 1976)	Ramsar Convention

1.4 Proposed Development description

1.4.1 Overview

Liverpool Bay CCS Ltd (hereafter referred to as 'the Applicant') is proposing the development of the HyNet Carbon Dioxide Transportation and Storage Project – Offshore ('the Proposed Development"). The Proposed Development is a Carbon Capture and Storage project within Liverpool Bay in the east Irish Sea. It is located within the CS004 Carbon Dioxide (CO_2) Appraisal and Storage Licence area, approximately 12 km to the north of the Welsh coastline and 2 km west of the English coastline (Figure 1.1).

The Applicant intends to repurpose existing oil and gas (O&G) infrastructure to transport and store CO_2 offshore at the depleted Hamilton, Hamilton North and Lennox hydrocarbon reservoirs. This will include the installation of new planned infrastructure, and modifications to existing installations. The offshore elements of the are hereafter referred to as "the Proposed Development", located in the "Eni Development Area", and are described in full in the Offshore ES at volume 1, chapter 3. These include:

- Offshore Platforms (OPs), including installation of the new Douglas CCS OP;
- Offshore CO_2 injection wells and CO_2 monitoring and sentinel wells;
- Offshore pipelines connecting the Point of Ayr (PoA) Terminal to Douglas OP;
- Offshore integrated power and Fibre Optic (FO) cables connecting the PoA Terminal to Douglas OP; and
- Offshore interplatform pipelines and integrated power and FO cables.

Most of the infrastructure associated with the Proposed Development is located seaward of 1 nm. Elements of the Proposed Development that are within 1 nm of the coastline and therefore relevant to this WFD assessment are:

- Repurposing of offshore pipelines connecting the PoA Terminal to Douglas OP; and
- New offshore integrated power and FO cables connecting the PoA Terminal to Douglas OP (seawards of MHWS).

1.4.1.1 Offshore pipelines

The existing pipeline from the PoA Terminal to the Douglas OP and a selection of the existing pipelines connecting Douglas OP to Hamilton North, Hamilton Main and Lennox OPs will be repurposed to transport CO_2. There are no additional modifications needed for the purpose of transporting CO_2 other than rerouting the short pipeline sections from the existing Douglas OP to tie in to the new Douglas CCS platform, located approximately 26 km from the PoA landfall site. Therefore, no physical changes to the current pipelines are expected within the Zone of Influence of the Proposed Development (as defined in section 1.5).

1.4.1.2 Offshore power and fibre optic cables

Douglas OP currently generates 13.8 kV, 60 Hz power with the existing gas fuelled turbine installed on the platform, and supplies Hamilton Main and Hamilton North OPs via a subsea cable, while Lennox OP is provided with power from Hamilton Main OP.

The existing inter platform subsea power cables are not suitable for re use for CO_2 service, consequently new inter platform power cables would be installed as part of the Proposed Development. In addition, the existing gas fuelled turbine on Douglas OP will be decommissioned at the end of its current use, and electrification of Douglas OP will be required from the Onshore PoA Terminal.

It is expected that the main power to Douglas OP would be supplied from the Onshore PoA Terminal by two new 33 kV, 50 Hz parallel subsea cables integrated with FO connection, each 35 km in length.

The Project Design Envelope (PDE) approach (also known as the Rochdale Envelope approach) has been adopted for the assessment of the Proposed Development, in accordance with current good practice (National Infrastructure Planning, 2018) and the 'Rochdale Envelope Principle'. The PDE concept allows for some flexibility in project design options, particularly cable installation and protection, where the full details of the Proposed Development are not known at application submission but will be confirmed in detail once the installation contractor is appointed. This approach has enabled a maximum design scenario (MDS) to be developed for the offshore power cables, fibre optic cables, and associated activities, which is presented in Table 1.3.

Table 1.3: Maximum Design Scenario for Installation of Offshore Power and FO Cables out to 1 Nm from MHWS, and out to the boundary of the North Wales water body

Parameter	Maximum Design Scenario
Maximum number of offshore power and FO cables	2
Offshore power and FO cable length, per cable (m) out to 1nm	1,852 (≈1 nm)
Maximum total offshore export cable length (m) out to 1nm	3,704
Maximum external cable diameter (mm)	152.40
Cable installation methodologies – seaward of MLWS (subtidal)	Plough, trenching, jetting. Preferred method is via plough.
Cable installation methodologies – landward of MLWS (intertidal)	Plough, trenching, jetting. Preferred method is via plough.
Maximum distance of trenchless (e.g. Horizontal Directional Drilling (HDD)) exit punch out from MHWS (m)	There will be no trenchless installation below MHWS
Maximum distance of trenching in intertidal	1,200 m
Target Minimum cable burial dept	2 m
Maximum cable burial depth	3 m
Maximum width of top of cable trench (per circuit) – intertidal	15 m
Maximum width of bottom of cable trench (per circuit) – intertidal	15 m
Maximum width of seabed disturbed by cable installation (per cable)	15 m
Maximum width of cable protection	7 m. Included within 15 m disturbance width from cable installation
Impacts up to WFD assessment 1 nm boundary	
Maximum area of seabed disturbed by cable installation via trenching (intertidal and subtidal)	2 x 1,852 m x 15 m = 55,560 m^2
Maximum area of seabed disturbance (intertidal) (see volume 2, chapter 7: Marine Biodiversity)	**18,000 m^2**
Maximum area of seabed disturbance due to dredging at West Hoyle Bank (see volume 2, chapter 6: Physical Processes)	1,000 m length x 21 m width = 21,000 m^2
Dredge footprint (guidance stipulates 1.5x the actual footprint)	21,000 m^2 x 1.5 = **31,500 m^2**
Maximum area of seabed disturbed by cable installation via trenching (excluding 1,000 m dredged length)	55,560 m^2 – (1,000 m x 15 m) = 55,560 m2 – 15,000 m2 = **40,560 m^2**
Maximum area of seabed disturbance out to 1 nm (intertidal and subtidal)	31,500 m + 40,560 m = **72,060 m^2** (0.072 km^2)

Parameter	Maximum Design Scenario
Impacts up to boundary of North Wales water body	
Straight line distance from boundary of water body to MHWS	6,400 m
Length of cable route out to water body boundary	7,300 m
Maximum area of seabed disturbed by cable installation via trenching (intertidal and subtidal)	2 x 7,300 m x 15 m = 219,000 m^2
Maximum area of seabed disturbance (intertidal)	18,000 m^2
Maximum area of seabed disturbance due to dredging at West Hoyle Bank	1,000 m length x 21 m width = **21,000 m^2**
Dredge footprint (guidance stipulates 1.5x the actual footprint)	21,000 m^2 x 1.5 = **31,500 m^2**
Maximum area of seabed disturbed by cable installation via trenching (excluding 1,000 m dredged length)	219,000 m^2 – (1,000 m x 15 m) = 219,000 m^2 – 15,000 m^2 = **204,500 m^2**
Maximum area of seabed disturbance out to water body boundary (intertidal and subtidal)	204,500m2 + 31,500 m^2 = 236,000 m^2 (0.236 km^2)

1.4.2 Construction

The area of disturbance for cable installation is expected to be approximately 15 m width for each trench. The two cables from PoA Terminal to Douglas OP are expected to be laid at a minimum separation distance of 30 m, within two separate trenches. The minimum cable burial depth (i.e. the distance from the seabed to the top of the cable) is expected to be between 2 to 3 m. The use of external cable protection, consisting of freshly quarried rock, sand filled geotextile bags, and concrete mattresses, is only planned where our cables cross other cables, and pipelines. The exact crossing arrangements will be confirmed following agreements with the relevant cable owners, but indicative arrangements would be for each crossing to be approximately 200 m in length, 7 m in width, and with ah profiled cross section of <1 m in height. The linear coverage at these crossing locations translates into approximately 10% of each length of cable.

1.4.2.1 Offshore cable installation

The cable route from PoA Terminal to Douglas OP crosses the Talacre dune system, which extends to the Mean Low Water Springs (MLWS) point. To cross the dunes, two parallel conduits would be installed using a Horizontal Directional Drilling (HDD) trenchless method. The exit pits of the HDD works would likely consist of temporary prefabricated steel containment sumps to capture any drilling fluid emitted from the drilling process. These would be located just above MHWS mark at approximately 2 m to 3 m below beach level, and due to this depth, following reburial would not require any external protection.

Following completion of HDD works it is expected that cables would be delivered via a marine vessel and then pulled ashore through the conduits using a winch.

Seawards of MLWS, at the shore approach, the proposed route for the cable corridor takes account of possible alternative options currently under assessment, accounting for the presence of the West Hoyle Spit and other constraints. Seawards of the shore approach, the cable routes would broadly follow the alignment of the existing pipelines connecting PoA Terminal to Douglas OP. Casing is not considered necessary for the offshore cables and as such the armoured cables would be directly buried for their entire length.

The following three techniques may be employed for the installation and burial of the two integrated offshore power and FO cables:

- Jetting (simultaneous post-lay trenching and burial);
- Ploughing (simultaneous post-lay trenching and burial); and
- Mechanical cutting (simultaneous post-lay trenching and burying).

In terms of cable post-lay trenching, ploughing could be utilised for cables in the presence of softer sediments such as sand and clay and would cause the least amount of disturbance to the surrounding environment. However, a more precautionary approach will be taken by this WFD assessment, wherein it will be assumed that cable installation would be achieved via jetting for the whole length of the WFD assessment area (i.e. 1 nm).

The key activities to be undertaken to prepare for the installation of subsea cables would include:

- Excavation of trench across West Hoyle Bank for cable shore pull;
- Cable shore pull-in from cable lay vessel to onshore location;
- Cable positioning on intermediate rollers;
- Pull-in through conduits;
- Offshore cable laying along pre-defined route;
- Cable burial (simultaneous post-lay trenching and burial);
- Cable termination and pull-in at OP side;
- ROV operations;
- Vessel operations (material transfer, crew change, logistics);
- Survey (pre-construction, post lay, and as-built); and
- Pre-commissioning of the system.

1.4.3 Operation and maintenance

1.4.3.1 Repurposing of existing pipelines

As discussed in section 1.4.1, there are no additional modifications needed within 1 nm of MHWS for the purpose of transporting CO_2, however, compression of CO_2 at the PoA terminal during the operation and maintenance phase will increase the temperature of the gas. There is the potential for this to increase the temperature of the surrounding environment of the foreshore and offshore pipeline, with potential for effects upon the benthic species associated with the sediment.

1.4.3.2 Offshore power and fibre optic cables

The subsea power cables associated with the Proposed Development can generate heat through resistive heating. This is caused by energy loss as electrical currents flow, resulting in heating of the cable surface and potential warming of the surrounding environment. High voltage cables are used to minimise the amount of energy lost as heat, thus minimising the warming effect.

1.4.4 Decommissioning

Existing UK legislation requires that when an offshore Carbon Capture, Usage, and Storage (CCUS) site is closed, the installations and injection facilities must be removed when decommissioned. In addition, all other items of equipment, infrastructure and materials that have been installed or drilled are expected to be entirely removed for disposal onshore in accordance with the government's aim to achieve a clear seabed.

The full details of the decommissioning phase activities will be determined closer to the time of decommissioning, but it is anticipated that the parameters for decommissioning will be lower or equal to that of the construction phase as sand wave clearance will not be required in advance of cable removal. The current planned activities will involve the removal of all foundations, cables, and cable crossing protection, while rock dump will be left *in situ*, constituting permanent habitat loss. To ensure minimisation of potential impacts from activities during this phase, an Environmental Management Plan (EMP) will be developed to reduce the impact

from pollutant spills are far as reasonably practicable. Also, a decommissioning plan will be developed and adhered to throughout this phase, adhering to existing UK and international legislation and guidance to ensure that the decommissioning of the infrastructure associated with the Proposed Development will result in the minimum amount of long-term disturbance to the environment.

1.4.5 Proposed measures adopted as part of the Proposed Development

To minimise the environmental impact of the Proposed Development throughout the construction, operation and maintenance, and decommissioning phases, various embedded mitigation measures have been proposed and will be put in place where appropriate. All mitigation techniques will be adopted in line with legislative requirements, or adopted standard industry practice where relevant.

For the purposes of the EIA process, the term 'Embedded Mitigation' is used to include the following measures (adapted from IEMA, 2016):

- Measures included as part of the Proposed Development design. These include modifications to the location or design envelope of the Proposed Development which are integrated into the application for consent. These measures are secured through the consent itself throughout the description of the development and the parameters secured in the Town and Country Planning Act (TCPA) and/or marine licence (referred to as 'primary mitigation' in IEMA, 2016).
- Measures required to meet legislative requirements, or actions that are standard practice used to manage commonly occurring environmental effects and are secured through the TCPA requirements and/or the conditions of the marine licences (referred to as 'tertiary mitigation' in IEMA, 2016).

A number of embedded mitigation measures (primary and tertiary) have been adopted as part of Proposed Development to reduce the potential for impacts on marine biodiversity. These are outlined in Table 1.4 below. As there is a secured commitment to implementing these measures, they are considered inherently part of the design of the Proposed Development. Therefore, these measures have been considered in the assessment of significance, presented in section 1.8 below. This means that the determination of magnitude and therefore significance assumes implementation of these measures.

Table 1.4: Embedded Mitigation Measures Adopted as Part of the Proposed Development

Embedded Mitigation	Justification
Primary Mitigation: Measures Embedded into the Project Design	
Development and adherence to a Cable Specification and Installation Plan (CSIP) post consent which will include cable burial where possible (in accordance with the specific policies set out in the North West Inshore and North West Offshore Coast Marine Plans (MMO, 2021)) and cable protection, as necessary.	The CSIP will set out appropriate cable burial depth in accordance with industry good practice, minimising the risk of cable exposure. The CSIP will also ensure that cable crossings are appropriately designed to mitigate environmental effects, these crossings will be agreed with relevant parties in advance of CSIP submission. The CSIP will include a detailed Cable Burial Risk Assessment (CBRA) to enable informed judgements regarding burial depth to maximise the chance of cables remaining buried whilst limiting the amount of sediment disturbance to that which is necessary. Measures will seek to reduce the amount of Electro Magnetic Fields (EMF) which benthic and fish and shellfish receptors are exposed to during the operations and maintenance phase by increasing the distance between the seabed surface and the surface of the cables.
No external cable protection in the intertidal area	To minimise potential impacts on intertidal habitats within the Dee Estuary SAC and SPA.
The HDD exit pit will be 3 m below seafloor	Embedded mitigation to ensure no materials are placed on the seafloor of the intertidal zone.
Development of and adherence to an Environmental Management Plan (EMP) that will be prepared and implemented during the construction, operational and maintenance and decommissioning phases of the Project. The EMP will include appendices detailing actions to minimise Invasive Non-Native Species (INNS) (the INNSMP), and a MPCP will be developed which will include planning for accidental spills, address all potential contaminant releases and include key emergency contact details (e.g. Environmental Protection Agency (EPA)).	Measures will be adopted to ensure that the potential for release of pollutants from construction, operational and maintenance and decommissioning plant is minimised. These will likely include: designated areas for refuelling where spillages can be easily contained, storage of chemicals in secure designated areas in line with appropriate regulations and guidelines, double skinning of pipes and takes containing hazardous substances, and storage of these substances in impenetrable bunds. All vessels will be required to comply with the standards set out in the International Convention for the Prevention of Pollution from Ships (MARPOL).
Implementation of piling initiation, soft-start, and ramp-up measures within the Marine Mammal Mitigation Protocol (MMMP). An initiation stage and soft starts will be used during the installation of pin piles. This involves the implementation of an initial low hammer energy with a low number of strikes, followed by lower hammer energies at a higher strike rate at the beginning of the piling sequence before energy input is 'ramped up' (increased) over time to required higher levels.	This measure will minimise the risk of injury to some fish, marine mammal, and marine turtle species in the immediate vicinity of piling activities, allowing individuals to move away from the area before noise levels reach a level at which injury may occur.
Inclusion of low order techniques as a unexploded ordnance UXO clearance option noting, however, that it is not possible to fully commit to this measure at this stage. Low order techniques are not always possible and are dependent upon the individual situations surrounding each UXO. Given that high order detonation may be required, the MMMP will also include mitigation to reduce the risk of injury from UXO clearance.	Low order techniques generate less underwater noise than high order techniques and therefore present a lower risk to sound-sensitive receptors such as fish, marine mammals, and marine turtles during UXO clearance.
Ongoing liaison with fishing fleets will be maintained via an appointed Fisheries Liaison Officer (FLO) and Fishing Industry Representative. Prior to construction, a Fisheries Liaison and Coexistence Plan (FLCP) will be developed, setting out in	To maintain effective communications between the Proposed Development and fishers and appropriate liaison with relevant fishing interests to ensure that they are fully informed of development planning and any offshore activities and works. To provide

Embedded Mitigation	Justification
detail the planned approach to fisheries liaison and means of delivering any other relevant mitigation measures.	warnings to the fishing community and advance warning of Proposed Development activities and associated Safety Zones and advisory safety distances.
A dropped objects plan will be developed for reporting and recovery of dropped objects where they pose a potential hazard to other marine users.	For the reporting and recovery of dropped objects.
Tertiary Mitigation: Measures Embedded into the Proposed Development Design	
Actions to minimise INNS, including a Biosecurity Plan (BP) to limit spread and introduction of INNS.	These measures will aim to manage and reduce the risk of potential introduction and spread of INNS so far as reasonably practicable to best protect the biological integrity of the local natural environment and communities.
Material arising from drilling and/or sand wave clearance will be deposited in close proximity to the works.	To retain material within sediment cell and maintain sediment transport regimes.
Development of, and adherence, to a Construction Method Statement (CMS).	This measure will confirm the actual methodology that will be employed to construct the Proposed Development, provide details on aspects of the methodology not known at the application stage and confirm that the methodology falls within the parameters assessment in the ES.
Development of, and adherence to a Decommissioning Plan	The aim of this plan is to adhere to the relevant UK and international legislation and guidance in place at the time, with decommissioning industry practice applied to reduce the amount of long-term disturbance to the environment so far as reasonably practicable.
Development of and adherence to a MMMP, based on a draft MMMP submitted alongside the ES. The MMMP will present measures for Piling UXO clearance and some types of geophysical activities. The MMMP will be developed on the basis of the most recent published statutory guidance and in consultation with key stakeholders.	**Piling**: for the purpose of developing the MMMP, a mitigation zone of 500 m will be applied, following the JNCC (2010a) guidance. The Draft MMMP will set out the measures to apply in advance of and during piling activity including the use of Marine Mammal Observers (MMObs), Passive Acoustic Monitoring (PAM), and Acoustic Deterrent Devices (ADD), thereby following the latest JNCC guidance (JNCC, 2010a). **UXO Clearance**: Measures including visual and acoustic monitoring (MMObs and PAM), the use of an ADD, and soft start charges will be applied to deter animals from the mitigation zone as defined by sound modelling for the largest possible UXO following the latest JNCC (2010b) guidance. **Geophysical and Seismic Surveys**: Mitigation for injury during high resolution geophysical and seismic site-investigation surveys using a sub-surface sensor from a conventional vessel will involve the use of MMObs and PAM to ensure that the risk of injury over the defined mitigation zone is reduced in line with JNCC (2017) guidance (500 m). Soft start is not possible for SBP equipment but will be applied for other high-resolution surveys where possible. It should be noted that some multi-beam surveys in shallow waters (<200m) are not subject to the requirements of mitigation.
Where practicable, any requirements for cable protection will be compliant with MGN 654.	Following further survey and detailed engineering, if areas are identified where external protection is required and the MCA condition of no more than 5% reduction in water depth is not achievable, a location specific review of impacts to shipping and consultation with the MCA will be carried out and additional mitigations agreed as required.

Embedded Mitigation	Justification
Development and adherence to a Pipeline Specification and Installation Plan which will include pipeline burial where possible and pipeline protection as necessary.	To ensure that the pipeline remains secure, is not a hazard to other sea users.

1.5 Zone of Influence and WFD assessment area

The Zone of Influence for the potential effects of operations associated with the Proposed Development on water bodies for WFD assessment, following the '*Clearing the Waters for All*' guidance, is generally considered to be within 2 km of the activity (defined below) being assessed. This distance is based upon the requirement for protected areas within 2 km of an activity being scoped in for assessment. Similarly, the MMO '*Marine Conservation Zones and Marine Licensing*' guidance (MMO, 2013) on Marine Conservation Zone (MCZ) assessment recommends the use of a risk-based approach to determine the "nearness" of an activity to protected areas. This includes applying an appropriate buffer zone to the features under consideration, as well as a consideration of risks for activities at greater distances. Since WFD assessment should consider the potential impacts upon any protected area within 2 km of an activity (Environment Agency, 2017), this approach has been adopted in determining an appropriate buffer zone (i.e. the Zone of Influence) to the features under consideration for this WFD assessment.

The WFD sets chemical and ecological objectives for all water bodies, and as discussed in section 1.1, and as advised in '*Clearing the Waters for All*', assessment of an activity for compliance with the requirements of the WFD should consider the potential impact upon WFD transitional and coastal receptors out to 1 nm. This stipulation is based on 'coastal water' being defined in the 2017 Regulations as extending to "*a distance of one nautical mile on the seaward side from the nearest point of the baseline*" (i.e. MHWS). However, following consultation with NRW (see Table 1.1), the assessment for WFD receptors associated with the chemical status of a water body has considered impacts of chemical quality elements out to 12 nm (Table 1.1), as per the definition of surface water in the 2017 Regulations.

The route for the offshore integrated power and FO cable is proposed to broadly follow the alignment of the existing offshore pipelines connecting the PoA Terminal to Douglas OP. However, the precise route has not yet been determined, so a precautionary approach has been taken in defining the WFD assessment area, applying an appropriate buffer to the Eni Development Area, rather than to the proposed cable route.

The WFD assessment area is therefore defined as the area within 2 km of the Eni Development Area (i.e. the Zone of Influence), out to 1 nm from MHWS for ecological receptors, and out to the offshore boundary of the relevant water body for chemical receptors, as illustrated in Figure1.2. The footprint of the activity (defined in section 1.6) has been calculated out to 1 nm (as per '*Clearing the Waters for All*' guidance) and out to the boundary of the North Wales water body (as per 2017 Regulations definitions).

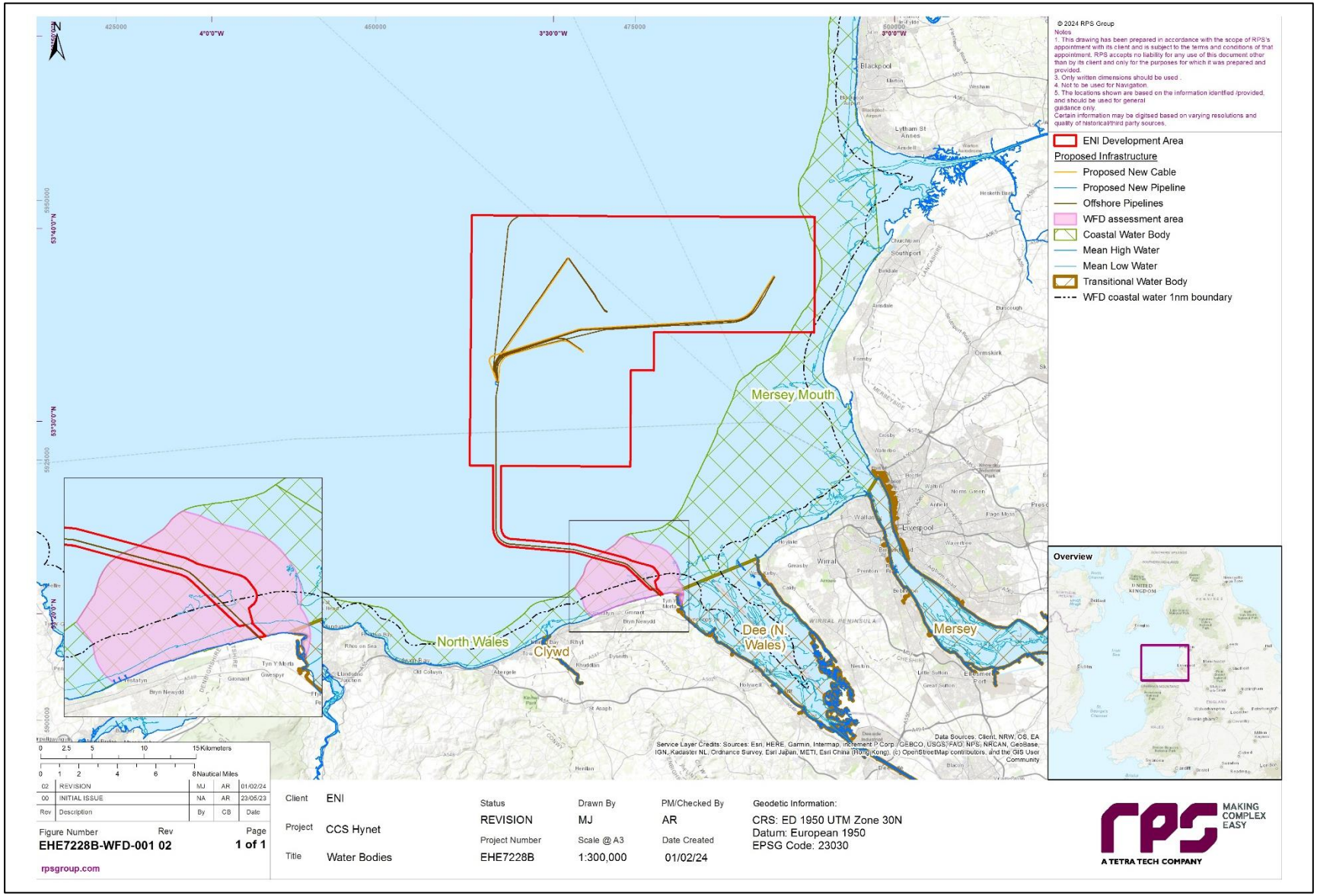

Figure1.2: WFD Assessment Area and Water Bodies in the Vicinity of the Proposed Development

1.6 Methodology

The '*Clearing the Waters for All*' guidance stipulates that the footprint of an activity should be considered when assessing its potential impact upon WFD water bodies and protected areas (as defined in section 1.6.2).

In the context of this WFD assessment, 'activity' refers to the following features of the Proposed Development, described in section 1.4, that are proposed to occur within the WFD assessment area:

- the construction, operation and maintenance, and decommissioning of two offshore integrated power and fibre optic (FO) cables connecting the PoA Terminal to Douglas OP; and
- the operation and maintenance of the repurposed existing offshore pipelines connecting the PoA Terminal to Douglas OP.

In the context of this WFD assessment, 'footprint' refers to the area of habitat potentially affected by the activity, which may also comprise a temperature or sediment plume, and for a dredging activity, a footprint is defined as 1.5 times the dredge area (Environment Agency, 2017). However, dredging is not anticipated to be required within the WFD assessment area, nor is the activity expected to produce a temperature or sediment plume.

1.6.1 Screening

According to the '*Clearing the Waters for All*' guidance, the aim of screening is to ensure that only those activities that may cause deterioration or prevent a water body from meeting its objectives are taken forward for assessment. Screening excludes any activities that do not need to go through the scoping or impact assessment stages. Activities which can be excluded from scoping include those which are considered to be low risk, such as:

- a self-service marine licence activity (MMO, 2018) or an accelerated marine licence activity that meets specific conditions, namely dredging (MMO, 2017);
- maintaining pumps at pumping stations;
- removing blockages or obstacles like litter or debris within 10m of an existing structure to maintain flow;
- replacing or removing existing pipes, cables or services crossing over a water body, but not including any new structure or supports, or new bed or bank reinforcement; or
- 'over water' replacement or repairs to, for example bridge, pier and jetty surfaces, so long as bank or bed disturbance is minimised.

The Proposed Development is not a fast-track or accelerated marine licence activity and does not fall into any of the categories of activities where scoping is not required. Therefore, the Proposed Development should proceed to the scoping stage.

1.6.2 Scoping

The aim of the scoping stage is to identify elements (receptors) within water bodies which may be impacted as a result of the Proposed Development. Any identified receptors, both chemical and ecological, will then be taken forward for a detailed impact assessment (section 1.8). A scoping assessment has been undertaken for each water body potentially affected by the Proposed Development, as presented in Table 1.8. Where robust justification could be provided, impacts on water bodies were scoped out from further consideration.

The receptors, as specified in the '*Clearing the Waters for All*' guidance, are:

- Hydromorphology;
- Biology – habitats;
- Biology – fish;
- Water quality;

- Protected areas; and
- INNS.

The *'Clearing the Waters for All'* guidance provides specific criteria for each of the receptors listed above to determine if an assessment of impacts is required and recommends the use of a scoping template as part of the WFD assessment process. These criteria are considered for each receptor in section 1.7 of this appendix, using the recommended scoping template (Environment Agency, 2016a).

The current status of water bodies is detailed within River Basin Management Plans (RBMPs) and supporting Appendices. Each RBMP includes the work undertaken over the preceding five years, and the plans/objectives for the next six years following publication. The aim of the WFD is to maintain and improve surface waters and water bodies out to 1 nm. As per the definitions in the 2017 Regulations, impacts associated with chemical quality elements have been considered out to 12 nm. Sediment sampling has been undertaken throughout the Eni Development Area, and results of these surveys out to 12 nm from MHWS are discussed, particularly in relation to polycyclic aromatic hydrocarbons (PAHs), total hydrocarbons (THC), polychlorinated biphenyls (PCBs) and heavy metals.

As discussed in section 1.5 WFD assessment is intended to focus on the potential for an activity (as defined in section 1.6) to prevent a water body achieving good status. While the focus of this WFD assessment is on those elements of the Proposed Development from MHWS out to approximately 1.8 nm to 3.5 nm, corresponding to the minimum and maximum distances of the WFD assessment area from MHWS (Figure1.2), consideration has been given to those activities out to 12 nm that could influence chemical status.

1.6.2.1 Hydromorphology

Hydromorphology, for the purposes of this assessment, is defined as the physical characteristics of the water body including the size, shape and structure of sediment and the flow and quantity of water and sediment.

1.6.2.2 Biology – habitats

Biological habitats (both those designated as higher or lower sensitivity habitats[2], summarised in Table 1.5) will be scoped in if the footprint (including sediment plumes and dredging areas) of activities is:

- 0.5 km^2 or greater (within the relevant WFD waterbody);
- 1% or more of the waterbody's area;
- Within 500 m of any higher sensitivity habitat; **or**
- 1% or more of any lower sensitivity habitat.

Note that impact assessment for biological habitats would be required if *any* of these criteria are met.

[2] Higher sensitivity habitats have a low resistance to, and recovery rate, from human pressures. Lower sensitivity habitats have a medium to high resistance to, and recovery rate from, human pressures.

Table 1.5: Sensitivity of WFD Biological Habitats to Human Pressures

Higher sensitivity habitats	Lower sensitivity habitats
Chalk reef	Cobbles, gravel and shingle
Clam, cockle and oyster beds	Intertidal soft sediments like sand and mud
Intertidal seagrass	Rocky shore
Maerl	Subtidal boulder fields
Mussel beds, including blue and horse mussel	Subtidal rocky reef
Polychaete reef[3]	Subtidal soft sediments like sand and mud
Saltmarsh	
Subtidal kelp beds	
Subtidal seagrass	

1.6.2.3 Biology – fish

The following impacts on fish were scoped in if:

- The activity is in an estuary and could affect the fish in the estuary;
- The activity could delay or prevent fish from entering the estuary;
- The activity could affect fish migrating through the estuary to freshwater;
- Fish could become entrained (for example being drawn into mechanical plant like cooling systems or tidal turbines); or
- Impingement could occur (for example fish becoming trapped against debris screens).

1.6.2.4 Water quality

The impacts resulting from the proposed activities on water quality were scoped in based on:

- Whether it could affect water clarity, temperature, salinity, oxygen levels, nutrients, or microbial patterns continuously for longer than a spring/neap tidal cycle;
- Whether it is in a waterbody/waterbodies with a phytoplankton status of moderate, poor or bad; or
- Whether the water body/water bodies have a history of harmful algae.

The water quality assessment assessed the potential for the release of chemicals (on the Environmental Quality Standards Directive (EQSD) list) and sediment bound contaminants (above Cefas Action Level 1) as a result of the proposed activities.

1.6.2.5 Protected areas

The ZoI for the impact of activities on WFD protected areas, following the '*Clearing the Waters for All*' guidance, is considered to be within 2 km of the activity being assessed. This approach has been adopted for this WFD assessment, and any protected areas within the 2 km ZoI of the activity were scoped in for a detailed impact assessment. For the purposes of this assessment, protected areas are defined as:

[3] Polychaete reef includes biogenic reef structures formed by the aggregation of species such as *Sabellaria* spp. and *Serpula* spp.

- Special Areas of Conservation (SAC);
- Special Protection Areas (SPA);
- Shellfish waters;
- Bathing waters;
- Nutrient sensitive areas (under the Urban Waste Water Treatment Directive);
- Nitrate Vulnerable Zones (NVZ) - polluted or sensitive; and
- Drinking Water Protected Areas (Surface and Ground).

1.6.2.6 Invasive Non-Native Species

The impacts resulting from an activity should be scoped in for assessment if it has the potential to introduce or spread INNS.

1.6.3 Impact Assessment

Following the scoping stage, if it was determined that the impact assessment stage was required (as per the '*Clearing the Water for All*' guidance), an impact assessment was undertaken for each receptor identified as being at risk from the activity. The impact assessment considered what pressures the activity could create on the receptors identified. The key aim of the impact assessment was to determine whether there was potential for deterioration in the status of a waterbody receptor, or any element within a water body.

Deterioration is defined as when the status (ecological or chemical) of a quality element reduces by one class, for example, ecological quality elements move from 'good' to 'moderate' status. If a quality element is already at the lowest status ('bad'), then any reduction in its condition also counts as deterioration. Where relevant, designed-in measures were included to avoid or minimise risks of deterioration (section 1.4.5).

Temporary effects due to short-duration activities such as construction and maintenance are not considered, in the '*Clearing the Waters for All*' guidance, to cause deterioration if the waterbody would recover in a short time without any restoration measures. However, it was noted that works that are temporary in nature may have longer term effects on aspects such as ecology. This assessment focussed upon identifying effects that may lead to non-temporary deterioration, which is defined here as occurring over a period of time that is greater than the recommended monitoring period interval as stated by the WFD, and are summarised in Table 1.6.

Table 1.6: Recommended Monitoring Period for WFD Quality Elements, Adapted from Annex V, Section 1.3.4 of the WFD

Quality element	Monitoring period	
	Transitional water bodies	Coastal water bodies
Biological		
Phytoplankton	6 months	6 months
Other aquatic flora	3 years	3 years
Macro-invertebrates	3 years	3 years
Fish	3 years	n/a
Hydromorphological		
Morphology	6 years	6 years
Physico-chemical		
Thermal conditions	3 months	3 months
Oxygenation	3 months	3 months
Salinity	3 months	n/a
Nutrient status	3 months	3 months

Quality element	Monitoring period	
	Transitional water bodies	Coastal water bodies
Other pollutants	3 months	3 months
Priority substances	1 month	1 month

The '*Clearing the Waters for All*' guidance, stipulates that if the activity could cause deterioration or hinder the achievement of the waterbody's objective (or potential), either of the quality element or supporting habitat, an explanation must be provided on how this deterioration could occur, including consideration of whether the impact is:

- direct and immediate - it will happen at the same time and place as the activity; or
- indirect - it will happen later or further away, including in other linked waterbodies.

Where the activity may cause deterioration, alternatives should be considered to minimise the impact, including changes to the materials or substances used, the size, scale or timing of the activity or methods of working and/or how equipment or services are used.

In addition to assessing the potential for deterioration of the current status of a waterbody, the impact assessment must consider the risk of jeopardising 'good status'. Every waterbody has a target status that it is expected to achieve, with an expected date by when this should be achieved, as set out in the RBMPs.

Where the status of a waterbody or quality element is less than 'good', the impact assessment should consider whether the activity may jeopardise the waterbody achieving 'good status' in the future. These may include activities which reduce the effectiveness of improvement activities taking place or prevent improvement activities taking place in the future. Details of these activities or measures are set out in the RBMPs.

1.7 Scoping

1.7.1 Overview

The following sections detail the findings of the Scoping stage of the WFD Assessment. As per the '*Clearing the Waters for All*' guidance, and adopts the structure outlined in the Environment Agency WFD scoping template (Environment Agency, 2016a). The potential risks of the activity to each of the key receptor groups are considered in the sections below.

Taking into consideration the WFD assessment area, as described in 1.5, water bodies that have the potential to be impacted have been identified, and are summarised in Table 1.7. Further details on these water bodies are presented in section 1.7.2 and Table 1.8 of this document.

Table 1.7: Water Bodies Screened into the WFD Assessment

Water body name	Type	Reason for including in scoping
North Wales (GB641011650000)	Coastal	Proposed route for integrated offshore power and FO cables overlaps with this water body.
Dee (N. Wales) (GB531106708200)	Transitional	This water body overlaps with the WFD assessment area, as described in section 1.5.

1.7.2 Status of the potentially affected WFD water bodies

The WFD assessment area (as illustrated in Figure1.2) overlaps with the North Wales water body (GB641011650000) and the Dee (N. Wales) water body (GB531106708200) (hereafter referred to as simply 'Dee water body'). These water bodies are therefore screened in for their potential to be affected by the activity. Table 1.8 summarises the statuses of the screened-in water bodies,

Table 1.9 presents the qualifying features of relevant National Network Sites and shellfish waters, and overlap with the screened-in water bodies, and Table 1.10 summarises the status of the bathing waters relevant to this WFD assessment. The protected areas relevant to this WFD assessment are illustrated in Figure 1.3.

Table 1.8: Status of WFD Water Bodies Screened in for Potential Impact from the Activity

Parameter	North Wales	Dee (N. Wales)
ID	GB641011650000	GB531106708200
Type	Coastal	Transitional
Year of assessment	2021 (Cycle 3)	2021 (Cycle 3)
Waterbody area (km^2)	146.25	109.29
Overall current status	Moderate	Moderate
Current status (ecological)	Moderate	Good
Current status (chemical)	Moderate	Moderate
Target	Good by 2033	Good by 2027
Driving ecological quality element	Mercury	Brominated diphenylether (BDPE) Calc, Polyaromatic hydrocarbons (PAH)
Is the waterbody heavily modified?	Yes	Yes
WFD phytoplankton classification	Moderate	Good
Dissolved inorganic nitrogen	Good	Good
Hydromorphology	Not Assessed	Not High

Table 1.9: Qualifying Features of SPAs, SAC and Shellfish Water within the WFD Assessment Area, and Overlap with WFD Water Bodies

Site	Primary qualifying features/relevant species	Spatial overlap with water body?	
		North Wales	Dee
Liverpool Bay SPA (UK9020294)	• Red-throated diver *Gavia stellata*; • Little gull *Larus minutus*; • Common scoter *Melanitta nigra*; • Little tern *Sterna albifrons*; • Common tern *Sterna hirundo*; and • Waterbird assemblage	Yes	No
The Dee Estuary SPA (UK9013011)	• Pintail *Anas acuta*; • Teal *Anas crecca*; • Dunlin *Calidris alpina alpina*; • Knot *Calidris canutus*; • Eurasian oystercatcher *Haematopus ostralegus*; • Bar-tailed godwit *Limosa lapponica*; • Black-tailed godwit *Limosa limosa islandica*; • Eurasian curlew *Numenius arquata*;	Yes	Yes

Site	Primary qualifying features/relevant species	Spatial overlap with water body?	
		North Wales	Dee
	• Grey plover *Pluvialis squatarola*; • Little tern *Sterna albifrons*; • Common tern *Sterna hirundo*; • Sandwich tern *Sterna sandvicensis*; • Shelduck *Tadorna tadorna*; • Redshank *Trianga tetanus*; and • Waterbird assemblage		
Dee Estuary SAC (UK0030131)	• Mudflats and sandflats not covered by seawater at low tide; • Salicornia and other annuals colonizing mud and sand; and • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*).	Yes	Yes
Dee (West) shellfish water	• Mussel *Mytilus* spp. • Cockle *Cerastoderma edule*	Yes	Yes

Table 1.10: Information and Status of Identified Bathing Waters Relevant for WFD Assessment

Parameter	Detail
Site name	Prestatyn
Identifier	40700
Local authority	Sir Dinbych - Denbighshire
Year of designation	1988
Distance from activity (km)	0.61
2022 Classification	Excellent
2021 Classification	Excellent
2020 Classification	Excellent
2019 Classification	Excellent

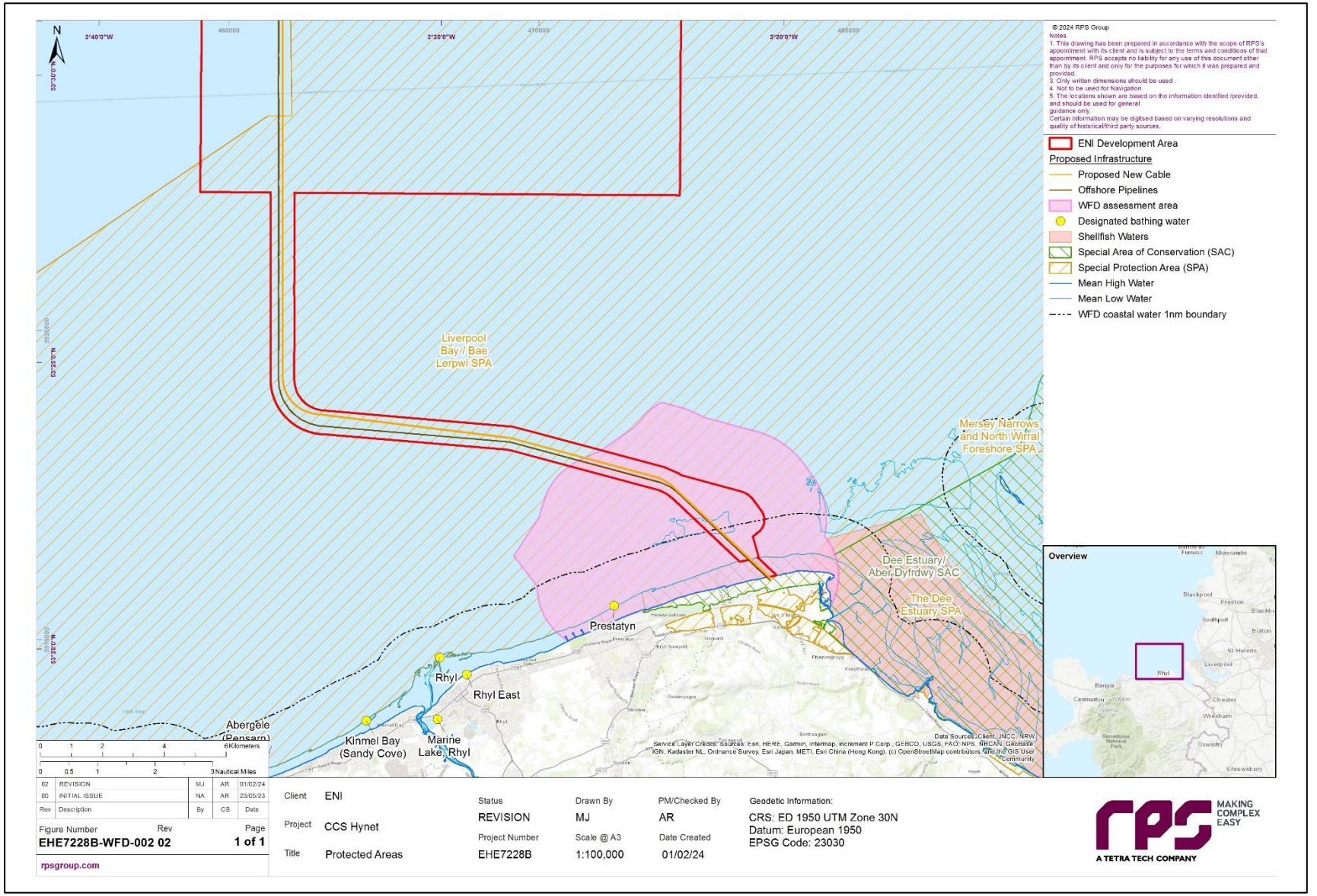

Figure 1.3: WFD Protected Areas Located within the WFD Assessment Area for the Proposed Development

1.7.3 North Wales water body

1.7.3.1 Hydromorphology

Hydromorphology influences the health of aquatic habitats and ecosystems. Changes to hydromorphology can drive fragmentation and loss of habitat, changes in the flow regime and disturbance of natural dynamics of sediment transport. Water bodies at 'high' hydromorphological status may therefore be more sensitive to human pressures, with potential for subsequent effects to overall ecological status. Table 1.11 provides the specific risk information for hydromorphology receptors.

Table 1.11: Specific Risk Information for Hydromorphology Receptors in the North Wales Water Body

Consideration	Key risk issues and justification	Scoped into assessment?
Activity could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status	The hydromorphology status of the North Wales water body has not been classified. However, as this is a heavily modified water body, high morphological status is not possible.	No: Impact assessment not required.
Activity could significantly impact the hydromorphology of any water body	Numerical modelling presented within the Offshore ES at volume 3, appendix H, indicates that hydromorphology would not be significantly impacted by the proposed activity. Effects of all cable installation activities will be temporary and reversible and would be highly localised.	No: Impact assessment not required.
Activity is in a water body that is heavily modified for the same use as your activity	The North Wales water body has been designated as a heavily modified water body for "*Coast protection use*" (NRW, 2022a). This designation is for coastal protection, which is not for the same use as the activity.	No: Impact assessment not required.

1.7.3.2 Biology – habitats

The Environment Agency scoping template provides a list of habitats which have a sensitivity to human pressures; split into higher and lower sensitivities. Table 1.12 is a reproduction of the list of sensitive habitats from the scoping template and Table 1.13 presents the specific risk information for biology habitat receptors.

Table 1.12: Habitat Sensitivity to Human Pressures. Habitats Present within the WFD Study Area are Highlighted in Bold Text, and Habitat Areas are Estimated from EMODnet Habitat Classifications

Habitat	Area within North Wales water body (km^2)	Area with 500 m of activity footprint (km^2)
Higher sensitivity habitats		
Chalk reef	0.00	0.00
Clam, cockle and oyster beds	0.00	0.00
Intertidal seagrass	0.00	0.00
Maerl	0.00	0.00
Mussel beds, including blue and horse mussel	0.00	0.00
Polychaete reef	0.00	0.00
Saltmarsh	0.00	0.00
Subtidal kelp beds	0.00	0.00

Habitat	Area within North Wales water body (km^2)	Area with 500 m of activity footprint (km^2)
Subtidal seagrass	0.00	0.00
Lower sensitivity habitats		
Cobbles, gravel and shingle	**21.71**	n/a
Intertidal soft sediments like sand and mud	0.00	n/a
Rocky shore	0.00	n/a
Subtidal boulder fields	0.00	n/a
Subtidal rocky reef	**0.01**	n/a
Subtidal soft sediments like sand and mud	**38.62**	n/a

Table 1.13: Specific Risk Information for Biological Habitat Receptors in the North Wales Water Body

Consideration	Key risk issues and justification	Scoped into assessment?
Footprint is 0.5 km^2 or larger	The footprint for cable installation will be assumed to be achieved via jetting for the full 1 nm from MHWS. For two cables, with an anticipated disturbance width of 15 m per cable and a disturbance length of 1,852 m (i.e. 1 nm), with 1 km of dredging across West Hoyle Bank, the footprint, as described in Table 1.3, would be 72,060 m^2 (0.072 km^2). For two cables, with an anticipated disturbance width of 15 m per cable and a disturbance length of 7,300 m (i.e. the length of the cable route within the WFD assessment area), with 1 km of dredging across West Hoyle Bank, the footprint, as described in Table 1.3, would be 204,500 m^2 (0.205 km^2). The estimated maximum footprint of the activity would not exceed 0.5 km^2 if measured to 1 nm or if measured to the boundary of the WFD assessment area (i.e. the boundary of the North Wales water body).	No to all: Impact assessment not required
Footprint is 1% or more of the water body's area	North Wales water body area = 146.25 km^2 Maximum footprint (to boundary of North Wales water body) = 0.205 km^2 Footprint as percentage of North Wales water body = 0.14%. The estimated maximum footprint of the activity would not exceed 1% of the area of the North Wales water body.	
Footprint is within 500m of any higher sensitivity habitat	As detailed in Table 1.12, there are no higher sensitivity habitats located within 500 m of the activity footprint.	
Footprint is 1% or more of any lower sensitivity habitat	The maximum footprint (0.205 km^2) is estimated to be greater than the total area of 'Subtidal rocky reef' habitat within the North Wales water body (0.01 km^2). However, no 'Subtidal rocky reef' is located within the WFD assessment area. For lower sensitivity habitats that may be present within the WFD assessment area: Area of 'Cobbles, gravel and shingle' = 21.71 km^2 Footprint as percentage of 'Cobbles, gravel and shingle' = 0.94% Area of 'Subtidal soft sediments like sand and mud' = 38.62 km^2	

Consideration	Key risk issues and justification	Scoped into assessment?
	Footprint as percentage of 'Subtidal soft sediments like sand and mud' = 0.53%. The estimated maximum footprint of the activity would not exceed 1% of any lower sensitivity habitat.	

1.7.3.3 Biology – fish

The '*Clearing the Waters for All*' scoping template provides a list of criteria which may impact fish species within relevant water bodies. Table 1.14 presents the specific risk information for biology fish receptors.

Table 1.14: Specific Risk Information for Fish Receptors in the North Wales Water Body

Consideration	Key risk issues and justification	Scoped into assessment?
Activity is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary	The activity is not located within an estuary and is not likely to delay or prevent fish from entering or migrating through the North Wales water body. The assessment presented in the Offshore ES at volume 2, chapter 7 predicted that installation or operation of the offshore power and FO cables would not significantly affect fish and shellfish populations, in particular migration of diadromous fish species migrating to/from estuarine habitats.	No: Impact assessment not required.
Activity could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	The installation and operation of the offshore power and FO cables beneath the seabed will not cause a change in depth or flow and will not create a physical barrier. The activity does not include a discharge pipe or outfall, and therefore no chemicals will be released into the marine environment that could cause a chemical change. Some noise is expected to be generated as a result of intertidal cable installation via HDD, but the magnitude is not likely to constitute an impact upon normal fish behaviour. The assessment presented in the Offshore ES at volume 2, chapter 7, predicted that installation or operation of the offshore power and FO cables would not significantly affect fish and shellfish movement, migration or spawning within this WFD waterbody.	No: Impact assessment not required.
Activity could cause entrainment or impingement of fish	The activity does not include any mechanical systems that could cause fish to become entrained, and no surfaces or screens against which fish could become impinged.	No: Impact assessment not required.

1.7.3.4 Water quality

The risk to water quality is split between specific risks to water quality in relation to phytoplankton and harmful algae (Table 1.15), those in relation to the use or release of chemicals (Table 1.16) and those risks in the mixing zone (Table 1.17).

Table 1.15: Specific Risk Information for Water Quality Receptors in the North Wales Water Body in Relation to Phytoplankton and Harmful Algae

Consideration	Key risk issues and justification	Scoped into assessment?
Activity could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	The resuspension of sediments into the water column would result in a short-term increase in SSC and reduction of clarity as a result of construction activities, such as sand wave clearance and cable installation. The methods used for installation would affect the amount of sediment displaced, but the impacts are anticipated to be localised and short lived, with SSC returning to pre-installation levels within a couple of days. SSC would not disperse to a significant level outside the footprint of the activities. A full characterisation of sediment displacement is presented in the Offshore ES at volume 3, appendix H, and an assessment of activities affecting the surrounding water quality is presented within the Offshore ES at volume 2, chapter 6. Resistive heating of power cables and compression of CO_2 in pipeline have the potential to increase the temperature of the surrounding sediment. Any temperature increase is expected to be minimal, and due to the natural fluctuations in temperature throughout the year, benthic subtidal and intertidal receptors are expected to be tolerant to small temperature increases. The impact of increased temperature to benthic ecology receptors has therefore been assessed as minor (the Offshore ES at volume 2, chapter 7).	No: Impact assessment not required.
Activity is in a water body with a phytoplankton status of moderate, poor or bad	This waterbody was assigned a phytoplankton status of moderate in the most recent Classification Cycle (Cycle 3: 2021).	**Yes: Requires impact assessment.**
Activity is in a water body with a history of harmful algae	This water body does not have a history of harmful algae.	No: Impact assessment not required.

Table 1.16: Specific Risk Information for Water Quality Receptors in the North Wales Water Body in Relation to the Use or Release of Chemicals

Consideration	Key risk issues and justification	Scoped into assessment?
Activity uses or releases chemicals on the Environmental Quality Standards Directive (EQSD) list	This activity does not involve the release of chemicals and the only substance which may be used is bentonite, during HDD within the intertidal area. Bentonite is an inert, non-toxic, natural clay mineral (<63 µm particle diameter) which is not on the EQSD list (Environment Agency, 2016b). Bentonite is included in the Cefas List of Notified Chemicals approved for use and discharge into the marine environment and is classified as a group E substance under the Offshore Chemical Notification Scheme (OCNS) (Cefas, 2022). Group E substances are the group least likely to cause environmental harm and are readily biodegradable and do not bioaccumulate. Bentonite is also included on the OSPAR List of Substances Used and Discharged Offshore which are Considered to Pose Little or No Risk to the Environment (PLONOR) (OSPAR, 2021).	No: Impact assessment not required.

Consideration	Key risk issues and justification	Scoped into assessment?
	OSPAR BAC was exceeded for anthracene, benzo[k]fluoranthene, benzo[a]pyrene, and fluoranthene at a number of sites, all of which are on the EQSD list. Any potential risk of accidental release of contaminants will be minimised through the use of temporary prefabricated steel containment sumps to capture any drilling fluid emitted and implementation of an approved EMP during the construction, and operation and maintenance phases (see section 1.4.5). No deterioration of the status of any sites designated under the WFD is therefore anticipated, should bentonite be used during HDD operations.	
Activity disturbs sediment with contaminants above Cefas Action Level 1	Sediment sampling has been conducted throughout the Eni Development Area, including within the North Wales water body and WFD Assessment area. No sediment contamination by PAHs or heavy metals was observed above Cefas Action Level 1 in samples taken within the North Wales water body, within the WFD assessment area, or at any sediment sampling stations within 12 nm of MHWS. Similarly, THCs and PCBs were below detectable limits at all sampling stations within 12 nm of MHWS. Full details of sediment sampling are presented in the Offshore ES at volume 3 appendix I1	No: Impact assessment not required.

Table 1.17: Specific Risk Information for Water Quality Receptors in the North Wales Water Body in Relation to Mixing Zones

Consideration	Key risk issues and justification	Scoped into assessment?
Activity has a mixing zone (such as a discharge pipeline or outfall) and the chemicals released are on the EQSD list	The activity does not include a discharge pipe or outfall, and therefore no chemicals will be released into the marine environment.	No: Impact assessment not required.

1.7.3.5 Protected areas

This WFD assessment considers if WFD protected areas, as defined in section 1.6.2 are at risk from the proposed activity. Five WFD protected areas overlap with the WFD assessment area: Liverpool Bay SPA, The Dee Estuary SPA, Dee Estuary SAC, Prestatyn bathing water and Dee (West) Shellfish water. Details of the qualifying features of these protected areas are summarised in

Table 1.9. The Dee Estuary Ramsar site coincides spatially with Dee Estuary SAC, however the '*Clearing the Waters for All*' guidance does not require Ramsar sites to be included as part of the WFD assessment (Environment Agency, 2017). Table 1.18 outlines the potential risk issues for these protected areas.

Table 1.18: Specific Risk Information for WFD Protected Areas Coinciding with the North Wales Water Body

Consideration	Key risk issues and justification	Scoped into assessment?
Activity is within 2 km of any WFD protected area[4]	The North Wales water body overlaps with five WFD protected areas, of which the following are located within the 2 km buffer for the activity (i.e. within the WFD assessment area): • Liverpool Bay SPA; • The Dee Estuary SPA; • Dee Estuary SAC; • Prestatyn bathing water; and • Dee (West) shellfish water. No Nutrient Sensitive Areas (under the Urban Waste Water Treatment Directive), Nitrate Vulnerable Zones (polluted or sensitive) or Drinking Water Protected Areas (Surface and Ground) are located within 2 km of the activity.	**Yes: Requires impact assessment.**

1.7.3.6 Invasive non-native species

Table 1.19 outlines the risk of the introduction of INNS.

Table 1.19: Specific Risk Information for INNS in the North Wales Water Body

Consideration	Key risk issues and justification	Scoped into assessment?
Activity could introduce or spread INNS	There is little evidence of adverse effects on fish and shellfish receptors resulting from colonisation of other offshore wind farms by INNS, and the risk of introduction and spread of INNS to benthic ecology receptors has been assessed as minor (the Offshore ES at volume 2, chapter 7). Furthermore, an EMP, and an INNS Management Plan (INNSMP), will be adopted and implemented to manage and reduce the risk of potential introduction and spread of INNS so far as reasonably practicable. All vessels will also operate in accordance with a BP, prepared in accordance with NRW Biosecurity Plan template. A draft BP has been included with the Marine License, and Carbon Dioxide Storage Permit applications, which shall be finalised following appointment of the EPC contractor, and submitted to NRW for prior approval, before the commencement of any works	No: Impact assessment not required.

1.7.4 Dee (N. Wales) water body

1.7.4.1 Hydromorphology

Table 1.20 provides the specific risk information for hydromorphology receptors.

[4] Note that a regulator can extend the 2 km boundary if the activity has an especially high environmental risk

Table 1.20: Specific Risk Information for Hydromorphology Receptors in the Dee Water Body

Consideration	Key risk issues and justification	Scoped into assessment?
Activity could impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status	The hydromorphology status of the Dee water body has been classified as "*Not High*" (NRW, 2021)	No: Impact assessment not required.
Activity could significantly impact the hydromorphology of any water body	Numerical modelling presented in the Offshore ES at volume 3, appendix H Technical Report indicates that hydromorphology would not be significantly impacted by the proposed activity, particularly given that the activity is expected to be of low magnitude and would not occur within this water body.	No: Impact assessment not required.
Activity is in a water body that is heavily modified for the same use as your activity	The Dee water body has been designated as a heavily modified water body for "*Navigation, ports and harbours use*" (NRW, 2022a). This designation is not for the same use as the proposed activity, and the activity does not overlap with this water body.	No: Impact assessment not required.

1.7.4.2 Biology – habitats

The Dee water body has been included in this WFD assessment due to its proximity to the Proposed Development (1.2 km). However, given that no works are planned to occur within the Dee water body, and the footprint of the activity will not occur within 500 m of any higher sensitivity habitat (as stipulated in the '*Clearing the Waters for All*' guidance) located within the Dee water body, no effect pathway is considered to exist for this receptor. Nonetheless, the scoping process for biological habitats in the Dee water body is presented in Table 1.21.

Table 1.21: Specific Risk Information for Biological Habitat Receptors in the Dee Water Body

Consideration	Key risk issues and justification	Scoped into assessment?
Footprint is 0.5 km^2 or larger	The proposed activity does not lie within the Dee water body, therefore its size in this context is not relevant to this assessment.	No to all: Impact assessment not required.
Footprint is 1% or more of the water body's area	The proposed activity does not lie within the Dee water body, therefore its size as a percentage of the water body in this context is not relevant to this assessment.	
Footprint is within 500 m of any higher sensitivity habitat	The proposed activity does not lie within 500 m of the Dee water body, and therefore does not lie within 500 m of higher sensitivity habitat contained with this water body.	
Footprint is 1% or more of any lower sensitivity habitat	The proposed activity does not lie within the Dee water body, therefore its size as a percentage of lower sensitivity habitat in this context is not relevant to this assessment.	

1.7.4.3 Biology – fish

Table 1.22 presents the specific risk information for biology fish receptors.

Table 1.22: Specific Risk Information for Fish Receptors in the Dee Water Body

Consideration	Key risk issues and justification	Scoped into assessment?
Activity is in an estuary and could affect fish in the estuary, outside the estuary but could delay or prevent fish entering it or could affect fish migrating through the estuary	The activity is not located within an estuary, but the Dee water body is an estuary. The activity will not delay or prevent fish from entering or migrating through the Dee water body. The assessment presented in the Offshore ES at volume 2, chapter 7 predicted that installation or operation of the export cables would not significantly affect fish and shellfish movement, migration or spawning within this WFD waterbody.	No: Impact assessment not required.
Activity could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	The presence of the offshore power and FO cables beneath the seabed will not cause a change in depth or flow and will not create a physical barrier to the Dee water body. The activity does not include a discharge pipe or outfall, and therefore no chemicals will be released into the marine environment that could cause a chemical change. Some noise is expected to be generated as a result of intertidal cable installation, but given the distance to this water body, the magnitude is not likely to constitute an impact upon normal fish behaviour. The assessment presented in the Offshore ES at volume 2, chapter 7 predicted that installation or operation of the offshore power and FO cables would not significantly affect fish and shellfish movement, migration or spawning within this WFD waterbody.	No: Impact assessment not required.
Activity could cause entrainment or impingement of fish	The activity does not include any mechanical systems that could cause fish to become entrained, and no surfaces or screens against which fish could become impinged.	No: Impact assessment not required.

1.7.4.4 Water quality

The risk to water quality is split between specific risks to water quality in relation to phytoplankton and harmful algae (Table 1.23), those in relation to the use or release of chemicals (Table 1.24) and those risks in the mixing zone (Table 1.25).

Table 1.23: Specific Risk Information for Water Quality Receptors in the Dee Water Body in Relation to Phytoplankton and Harmful Algae

Consideration	Key risk issues and justification	Scoped into assessment?
Activity could affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	Given the distance of the Dee water body from the proposed activity it is not anticipated that water temperature or salinity would be affected as a result of offshore power and FO cable installation activities. The resuspension of sediments into the water column would result in a short-term increase in SSC and reduction of clarity as a result of construction activities, such as sand wave clearance and cable installation. The methods used for installation would affect the amount of sediment displaced, but the impacts are anticipated to be localised and short lived. SSC would not disperse to a significant level outside the footprint of the activities and is therefore unlikely to affect water quality in the Dee	No: Impact assessment not required.

Consideration	Key risk issues and justification	Scoped into assessment?
	water body. A full characterisation of sediment displacement is presented in the Offshore ES at volume 3, appendix H and an assessment of the activities affecting the surrounding water quality is presented in the Offshore ES at volume 2, chapter 6.	
Activity is in a water body with a phytoplankton status of moderate, poor or bad	The phytoplankton status of the Dee water body is 'good' (NRW, 2021) and the proposed activity does not lie within the Dee water body.	No: Impact assessment not required.
Activity is in a water body with a history of harmful algae	The Dee water body does not have a history of harmful algae.	No: Impact assessment not required.

Table 1.24: Specific Risk Information for Water Quality Receptors in the Dee Water Body in Relation to the Use or Release of Chemicals

Consideration	Key risk issues and justification	Scoped into assessment?
Activity uses or releases chemicals on the Environmental Quality Standards Directive (EQSD) list	This activity does not involve the release of chemicals and the only substance which may be used is bentonite, during HDD within the intertidal area. Bentonite is an inert, non-toxic, natural clay mineral (<63 µm particle diameter) which is not on the EQSD list (Environment Agency, 2016b). Bentonite is included in the Cefas List of Notified Chemicals approved for use and discharge into the marine environment and is classified as a group E substance under the Offshore Chemical Notification Scheme (OCNS) (Cefas, 2022). Group E substances are the group least likely to cause environmental harm and are readily biodegradable and do not bioaccumulate. Bentonite is also included on the OSPAR List of Substances Used and Discharged Offshore which are Considered to Pose Little or No Risk to the Environment (PLONOR) (OSPAR, 2021). Any potential risk of accidental release of contaminants will be minimised through use of temporary prefabricated steel containment sumps to capture any drilling fluid emitted and the implementation of an approved EMP during the construction, and operation and maintenance phases (see section 1.4.5). No deterioration of the status of any sites designated under the WFD is therefore anticipated, should bentonite be used during HDD operations.	No: Impact assessment not required.
Activity disturbs sediment with contaminants above Cefas Action Level 1	Sediment sampling has not been conducted within the water body as the footprint of the activity lies entirely outside the waterbody. However, sediment sampling has been conducted throughout the Eni Development Area, including much of the WFD assessment area. No sediment contamination by PAHs or heavy metals was observed above Cefas Action Level 1 in samples taken within the WFD assessment area, in the neighbouring North Wales water body, or at any sediment sampling stations within 12 nm of MHWS. Similarly, THCs and PCBs were below detectable limits at all sampling stations within 12 nm of MHWS.	No: Impact assessment not required.

Table 1.25: Specific Risk Information for Water Quality Receptors in the Dee Water Body in Relation to Mixing Zones

Consideration	Key risk issues and justification	Scoped into assessment?
Activity has a mixing zone (such as a discharge pipeline or outfall) and the chemicals released are on the EQSD list	The activity does not include a discharge pipe or outfall, and therefore no chemicals will be released into the marine environment.	No: Impact assessment not required.

1.7.4.5 Protected areas

Three WFD protected areas overlap with the WFD assessment area: The Dee Estuary SPA, Dee Estuary SAC, and Dee (West) Shellfish water. Details of these protected areas is summarised in Table 1.26 and qualifying features of these protected areas are presented in Table 1.9.

Table 1.26: Specific Risk Information for WFD Protected Areas Coinciding with the Dee Water Body

Consideration	Key risk issues and justification	Scoped into assessment?
Activity is within 2 km of any WFD protected area[5]	The Dee water body overlaps with three protected areas, of which the following are located within the 2 km buffer for the activity (i.e. within the WFD assessment area): • The Dee Estuary SPA; • Dee Estuary SAC; • Dee (West) shellfish water. No bathing waters, Nutrient Sensitive Areas (under the Urban Waste Water Treatment Directive), Nitrate Vulnerable Zones (polluted or sensitive) or Drinking Water Protected Areas (Surface and Ground) are located within 2 km of the activity.	**Yes: Requires impact assessment.**

1.7.4.6 Invasive non-native species

Table 1.27 outlines the risk of the introduction of INNS.

Table 1.27: Specific Risk Information for INNS in the Dee Water Body

Consideration	Key risk issues and justification	Scoped into assessment?
Activity could introduce or spread INNS	There is little evidence of adverse effects on fish and shellfish receptors resulting from colonisation of other offshore wind farms by INNS and the risk of introduction and spread of INNS to benthic ecology receptors has been assessed as minor, and (the Offshore ES at volume 2, chapter 7). The distance between the cable corridor and the Dee water body will also naturally reduce the likelihood of the introduction or spread of INNS. Furthermore, an EMP and INNSMP will be adopted and implemented to manage and reduce the risk of potential introduction and spread of INNS so far as reasonably practicable. All vessels will also operate in accordance with a BP, prepared in accordance with NRW Biosecurity	No: Impact assessment not required.

[5] Note that a regulator can extend the 2 km boundary if your activity has an especially high environmental risk

Consideration	Key risk issues and justification	Scoped into assessment?
	Plan template. A draft BP has been included with the Marine License, and Carbon Dioxide Storage Permit applications, which shall be finalised following appointment of the EPC contractor, and submitted to NRW for prior approval, before the commencement of any works	

1.7.5 Summary of scoping

Table 1.28 presents a summary of the WFD scoping for the North Wales and Dee water bodies.

Table 1.28: Summary of Scoping for WFD Receptors in the North Wales and Dee Water Bodies

WFD receptor	Potential risk?	Reason/features affected	Risk issue(s) for impact assessment
North Wales water body			
Hydromorphology	No	n/a	n/a
Biology: habitats	No	n/a	n/a
Biology: fish	No	n/a	n/a
Water quality	Yes	The North Wales water body was assigned a phytoplankton status of moderate in Classification Cycle 3, 2021.	Is within a waterbody with a phytoplankton status of moderate, poor or bad.
Protected areas	Yes	Liverpool Bay SPA The Dee Estuary SPA Dee Estuary SAC Prestatyn Bathing Water Dee (West) Shellfish water	Within 2 km of any WFD protected area.
INNS	No	n/a	n/a
Dee water body			
Hydromorphology	No	n/a	n/a
Biology: habitats	No	n/a	n/a
Biology: fish	No	n/a	n/a
Water quality	No	n/a	n/a
Protected areas	Yes	The Dee Estuary SPA Dee Estuary SAC Dee (West) Shellfish water	Within 2 km of any WFD protected area.
INNS	No	n/a	n/a

1.8 Impact assessment

Based on the WFD scoping for the North Wales and Dee water bodies presented in sections 1.7.3 and 1.7.4, the receptors scoped in for assessment are summarised in Table 1.29.

Table 1.29: Summary of WFD Receptors Scoped In or Out for Assessment, for Each of the North Wales and Dee Water Bodies

WFD receptor	Scoped in for assessment?	
	North Wales	Dee
Hydromorphology	No	No
Biology: habitats	No	No
Biology: fish	No	No
Water quality	**Yes**	No
Protected areas	**Yes**	**Yes**
INNS	No	No

All impacts scoped in for assessment are considered in the context of the embedded mitigation measures described in section 1.4.5.

1.8.1 Water quality

The offshore power and FO cable route crosses the North Wales coastal waterbody and consideration of the potential for a deterioration in water quality within this waterbody is required. This includes the potential for the effects of the activity to cause an increase in SSC, nutrients, dissolved oxygen (DO) or bacterial concentrations, over periods greater than a spring-neap tidal cycle (approximately 14 days) and to detrimentally affect the North Wales waterbody Classification Cycle 3 (2021) 'moderate' phytoplankton status. Phytoplankton is not considered to be vulnerable to the installation or operation of cables, however this has been scoped in due to the 'moderate' phytoplankton status of this waterbody, as outlined in section 1.7.3.

Liverpool Bay is fed by numerous rivers along the coast of north Wales and north-west England, including three large estuaries associated with urban development and industrialisation: the Dee, the Mersey and the Ribble. Alongside these inputs, the eastern Irish Sea has a history of oil and gas extraction which may have contributed to the current chemical status of Liverpool Bay (Dickson, 1987; Cefas, 2005). Seabed disturbance and an increase in SSC associated with the installation of the offshore power and FO cable and landfall works may result a reduction in water quality and may cause sediment-bound contaminants and nutrients to be released into the water column. When nutrient loading is high phytoplankton blooms may occur, after which phytoplankton will die. Bacteria and other decomposer organisms then break down this organic matter and dissolved oxygen (DO) levels may become reduced (NRW, 2023a).

The North Wales water body does not have a history of harmful phytoplankton blooms (NRW, 2021) and no nutrients are anticipated to be released in significant concentrations from the seabed as a result of the activity, beyond those expected in typical storm conditions. There are no outfalls or discharges associated with the Proposed Development so the proposed activities are not expected to cause a reduction in DO in the water column.

The presence of live bacteria, including *E.coli* and intestinal enterococci, is strongly influenced by the amount of UV light penetrating the water column. Under lower UV scenarios, as occurs when SSC is high, survival of bacterium such as *E. coli* may increase (Bashwari *et al*., 2020). Since bacterial counts within the water column are a determinant of water quality at designated bathing waters, this may represent a potential impact to bathing water status at the Prestatyn bathing water (located approximately 0.6 km from the boundary of the Eni Development Area).

Numerical modelling of SSC presented in the Offshore ES at volume 3, appendix H indicated that increases in SSC will be greatest close to the site of cable installation, reducing in magnitude at a range of a few hundred metres from the cable, and falling to background levels at a range of a few kilometres. The effects of increased SSC are expected to be temporary, short term and intermittent over a 14-day spring/neap tidal cycle.

Sediment sampling has been undertaken throughout the Eni Development Area, and no sediment contamination by PAHs or heavy metals was observed above Cefas Action Level 1 at any sampling stations within 12 nm of MHWS. This includes all samples taken within the North Wales water body, all those within the WFD assessment area, and all those within the 1 nm WFD assessment boundary stipulated in the '*Clearing the Waters for All*' guidance. Similarly, THCs and PCBs were below detectable limits at all sampling stations within 12 nm of MHWS. The installation of offshore integrated power and FO cables is therefore not considered to result in the mobilisation of sediment-bound contaminants that could affect either the biological or chemical status of the waterbody.

The construction, operation and maintenance and decommissioning of the offshore power and FO cables and landfall works is not predicted to cause a deterioration in the either the biological or chemical status of the North Wales waterbody with respect to water quality. Increased SSC is expected to disperse rapidly at distances of hundreds of metres from cable installation works and phytoplankton is not expected to bloom in response to nutrient availability. The effects of the activity are therefore expected to be of negligible significance, which is not significant in EIA terms. The Proposed Development is therefore considered, in this respect, to be compliant with the requirements of the WFD.

1.8.2 Protected areas

All protected areas that have been scoped in for assessment for the Dee water body are common to the North Wales water body, and as such these have been considered for both water bodies together. The WFD assessment area (as defined in section 1.5) overlaps with the following five WFD protected areas:

- Liverpool Bay SPA;
- The Dee Estuary SPA;
- Dee Estuary SAC;
- Prestatyn Bathing Water; and
- Dee (West) Shellfish water.

A detailed assessment has been undertaken on all SPAs and SACs within the Offshore ES at volume 3, appendix P. This provides a summary of the results of the HRA Stage 1 Screening for Likely Significant Effects (LSE) and, for those sites screened in, a detailed assessment in order to determine whether there will be any Adverse Effect on Integrity (AEoI) for the Proposed Development alone or in-combination with other plans or projects.

Liverpool Bay SPA and The Dee Estuary SPA

A total of 37.02 km^2 of the Proposed Development overlaps the Liverpool Bay SPA (1.47% of the SPA), and 0.209 km^2 of the Proposed Development is situated within The Dee Estuary SPA (0.146% of the SPA). The RIAA (Offshore ES volume 3, appendix P) assessed the following relevant impacts to the Liverpool Bay SPA and the Dee Estuary SPA conservation objectives:

- Indirect impacts from changes in prey availability; and
- Accidental pollution in the surrounding area.

Indirect impacts to birds from changes in prey availability may result from activities such as seabed disturbance and associated increases in SSC, and was assessed against two conservation objectives for the Liverpool Bay SPA and The Dee Estuary SPA:

- Objective 4: To maintain or restore the population of each of the qualifying features; and
- Objective 5: To maintain or restore the distribution of the qualifying features within the site.

Impacts from changes in prey availability are predicted to be short term and of high reversibility, lasting only for the duration of construction and decommissioning, and therefore considered to apply only to these phases.

No significant impact on fish receptors is concluded within the Offshore ES at volume 2, chapter 7 and volume 3, appendix P, and both fish and birds are predicted to move away from project activities similarly, therefore AEoI to the Liverpool Bay SPA and The Dee Estuary SPA are not expected for most species in terms of populations or distributions of qualifying features. For little tern *Sternula albifrons*, 8.6% of the foraging range during the breeding season (limited to 5 km) may be affected, leading to a conclusion of a potential moderate adverse impact on the population and distribution of qualifying features during construction and decommissioning, and on the site integrity for both Liverpool Bay SPA and The Dee Estuary SPA.

There is a risk of pollutants being accidentally released during the construction, operation and maintenance and decommissioning phases of the Proposed Development from sources including vessels/vehicles and equipment/machinery; the likelihood of an accidental release of pollutants is extremely low. This impact was assessed against the same two conservation objectives described above for the impacts from changes in prey availability.

Impacts from accidental pollution in the surrounding area during all Proposed Development phases are expected to be limited both temporally and spatially, with the necessary action plans in place to prevent AEoI to the Liverpool Bay SPA and The Dee Estuary SPA. If an event were to occur, the distributional impacts would be short-term and reversible. The assessment within the Offshore ES at volume 3, appendix P concluded negligible adverse effects on the distribution of qualifying features within the site, and no adverse effects on the populations of qualifying features, with no adverse effect on site integrity overall.

Dee Estuary SAC

The Proposed Development sits within 0.21 km^2 of the Dee Estuary SAC (0.13% of the SAC) which is designated for the following relevant qualifying features:

- Annex I habitats and habitats of qualifying features:
  - Mudflats and sandflats not covered by seawater at low tide;
  - *Salicornia* and other annuals colonising mud and sand;
  - Atlantic salt meadows *Glauco – Puccinellietalia maritimae*; and
  - Estuaries.
- Diadromous fish
  - Sea lamprey *Petromyzon marinus*; and
  - River lamprey *Lampetra fluviatilis*.

The following impacts assessed within the Offshore ES at volume 3, appendix P were considered relevant to the WFD assessment:

- Increased suspended sediment concentrations and associated deposition;
- Increased temperature impacting benthic and marine communities (Annex I habitats and habitats of qualifying species only);
- Impacts resulting from the release of sediment bound benthic contaminants (Annex I habitats and habitats of qualifying species only); and
- Underwater noise impacting fish receptors (Annex II diadromous fish only).

Impacts to Annex I habitats and habitats of qualifying features were assessed against four conservation objectives, and Annex II diadromous fish against five conservation objectives which are described in full in the Offshore ES at volume 3, appendix P.

Increased SSCs can impact water quality, and may occur through sand wave clearance and cable laying, including trenching, with plumes within the water column extending up to 15 km from the source to the west during the construction and decommissioning phases, and therefore may extend into the Dee Estuary.

However, levels of SSCs within the plume are expected to be within the range of background levels (i.e. 30 mg/l). This impact is therefore highly unlikely to adversley affect natural processes within the estuarine environment, mudflat and sandflat communities, *Salicornia* and other annuals colonising mud and sand and Atlantic salt meadows. No adverse effects on the qualifying Annex I habitats as or habitats of qualifying features which undermine the conservation objectives of the Dee Estuary SAC are expected to occur as a result of increases in SSCs and associated deposition.

Further, for Annex II diadromous fish, Natural England and Countryside Council for Wales (2010) identified both species of lamprey as not vulnerable to changes in turbidity or siltation due to their mobility. The subtidal zone of the Dee is believed to provide an important breeding, sheltering and nursery area for coastal fish species, which may be important prey for river and sea lamprey. However, given that the sediment plumes resulting from activities along the cable route will stay within background levels of the naturally turbid system of the Dee Estuary, it can be anticipated that this pressure will not alter the availability of prey species during any of the phases of the Proposed Development and therefore have no effect on the population of the Annex II diadromous fish. No adverse effects on the qualifying Annex II diadromous fish which undermine the conservation objectives of the Dee Estuary SAC will occur through impacts resulting from increased SSCs and associated deposition.

There is potential for increased temperatures from the subsea pipeline and power cables to impact the immediate environment, in-turn affecting the benthic species associated with the sediment, and temperature changes can affect water quality. Natural gas currently flows into the PoA terminal from offshore production. As the natural gas reaches the foreshore pipeline, having travelled through the marine environment, it is at or near equilibrium with the sea temperature. With the Proposed Development, CO_2 will flow from the PoA terminal out through the foreshore pipeline to the Douglas Process OP. Compression at the PoA terminal could potentially increase the temperature of the gas. However, the temperature of the subsea pipelines is expected to be lower than when the pipelines were used for natural gas transportation and impacts are predicted to be minimal. Intertidal mudflats and sandflats were not recognised as vulnerable to changes in thermal regime (Natural England and Countryside Council for Wales, 2010). This impact is highly unlikely to adversely affect natural processes within the estuarine environment. Given the very narrow footprint of potential temperature increases as a result of pipeline operation, as well as natural temperature fluctuations, this pressure is not expected to adversely affect the extent and distribution of habitats of qualifying species as well as mudflats and sandflats not covered by the seawater at low tide. No adverse effects on the qualifying Annex I habitats as or habitats of qualifying features which undermine the conservation objectives of the Dee Estuary SAC are expected to occur as a result of increases temperatures from the subsea pipeline or power cables.

Seabed disturbances due to construction and decommissioning activities could potentially lead to the remobilisation of previously sediment bound contaminants which could impact the surrounding benthic communities and water quality associated with the supporting habitat. However, the assessment presented in the Offshore ES at volume 2, chapter 7, based on the site-specific physical processes modelling, suggested that the nature of the construction activities is not likely to result in any remobilisation of previously sediment bound contaminants due to the already turbid and dynamic nature of the intertidal zone. As such, this pressure is not expected to adversely affect the extent and distribution of habitats of qualifying species as well as mudflats and sandflats not covered by seawater at low tide, *Salicornia* and other annuals, Atlantic salt meadows and estuaries. No adverse effects on the qualifying Annex I habitats as or habitats of qualifying features which undermine the conservation objectives of the Dee Estuary SAC are expected to occur as a result of impacts resulting from the release of sediment bound benthic contaminants.

Underwater noise can potentially have an adverse impact on fish species, such as behavioural effects, and physical injury and/or mortality through activities such as pile driving (construction only), UXO clearance (construction only) and geophysical or seismic survey (all Proposed Development phases) and can create a barrier to migration. Auditory injury can occur either as a Temporary Threshold Shift (TTS) where an animal's auditory system can recover, or Permanent Threshold Shift (PTS), where there is no hearing recovery in the animal. Lamprey are considered to have a low vulnerability to underwater noise impacts overall, due to their relatively simple ear structure, and are understood to detect sound in the environment through particle motion.

Based on maximum peak experience (SPL_{pk}) and maximum hammer energy (i.e. 3,000 kJ), mortality and recoverable injury to lampreys may occur within a maximum of 184 m of the piling activity, a range of tens to hundreds of metres for UXO clearance and up to 26 m for vertical seismic profiling (VSP). Behavioural responses due to piling may occur up to 33 km from the source, although this is considered highly conservative. Piling represents the largest potential impact and will take place over a short duration (up to 13.5 hours, based upon up to 100 m minutes of piling at each of eight pin piles), intermittently and is therefore unlikely to adversely affect the population of river and sea lamprey. No adverse effects on the qualifying Annex II diadromous fish which undermine the conservation objectives of the Dee Estuary SAC will occur through impacts resulting from underwater noise.

Prestatyn bathing water

The Prestatyn bathing water is located approximately 4.2 km from the proposed route of the integrated offshore power and FO cables, and approximately 0.6 km from the Eni Development Area (Figure 1.3), and has received an annual classification of 'Excellent' between 2018 and 2022. There was a total of eight warnings of a pollution risk forecast due to heavy rain during the 2022 bathing water season, although no samples were collected on a day that coincided with these warnings.

Given that bathing water status is determined in part by bacterial sampling, the consistent 'Excellent' classification of the Prestatyn bathing water suggests that levels of bacteria within nearby sediments do not result in a reduction in water quality when disturbed and mobilised during storm events. Moreover, the short-term nature of any sediment plumes associated with cable installation suggests that any relative increase in bacteria would be negligible in terms of WFD compliance. No deterioration or non-compliance at the Prestatyn bathing water is anticipated to occur as a result of the Proposed Development.

Dee (West) shellfish water

The Dee (West) shellfish water is located approximately 1 km from the Eni Development Area, and approximately 1.1 km from the proposed route of the offshore power and FO cables. The site was designated for the harvesting of mussel (*Mytilus* spp.) and cockle (*Cerastoderma edule*): two largely sedentary species, which may be more sensitive to increased SSC than more mobile species. Similarly, microbial sampling is a determinant of compliance for shellfish waters, and bacterial levels may be at risk of increase following mobilisation of sediment (see section 1.8.1). As for the Prestatyn bathing water, however, disturbance of sediments during storm events does not result in a reduction in water quality (NRW, 2023b) and given that the installation of the offshore power and FO cables is not proposed to overlap spatially with the Dee (West) shellfish water, no deterioration or non-compliance is anticipated to occur here as a result of the Proposed Development.

1.9 Summary

Based on the WFD Scoping presented in section 1.7 and the assessment of effects presented in section 1.8 there is no potential for deterioration of the North Wales or Dee water bodies. In most instances, the relevant activities for the construction, operation and maintenance and decommissioning of the integrated offshore power and FO cables associated with the Proposed Development have been scoped out of the assessment as they are below the thresholds set by the '*Clearing the Waters for All*' guidance.

In the context of water quality, one criterion was met by the activity for scoping impacts into the assessment: the activity "*is in a waterbody with a phytoplankton status of moderate, poor or bad*". Increased SSC from installation and decommissioning of the power and FO cables is expected to disperse rapidly (i.e. within four days) at distances of hundreds of metres from cable installation works and phytoplankton is not expected to bloom in response to nutrient availability. Sediment-bound contaminants are not considered likely to increase in bioavailability or eco-toxicological effects, within the 1 nm WFD assessment boundary described in the '*Clearing the Waters for All*' guidance, within the WFD Assessment Area (as described in section 1.5), or within

12 nm of MHWS for 'chemical status'. The effects of the activity are expected to be of negligible significance in the EIA, and do not represent a deterioration in either the biological or chemical status of this WFD element of the North Wales water body. The Dee water body was not scoped in for assessment as no water quality elements were considered to be at risk of deterioration.

The Eni Development Area lies "*within 2 km of any WFD protected area*", as defined by the '*Clearing the Waters for All*' guidance: Liverpool Bay SPA, The Dee Estuary SPA, Dee Estuary SAC, Prestatyn bathing water; and Dee (West) shellfish water. The qualifying features of the SPA and SAC, and the parameters for classification of the bathing water and shellfish, were considered to the potential to be impacted by the activities, particularly during the construction and decommissioning phases. The construction, operation and maintenance and decommissioning of the offshore power and FO cables are not predicted to jeopardise the conservation objectives or status of the scoped-in WFD protected areas. The effects of the activity are therefore not predicted to represent a deterioration in the status of this WFD element of the North Wales or Dee water bodies.

Based on the assessment of effects related to the integrated offshore power and FO cables for the Proposed Development, there is no potential for significant impacts on the habitats - biology, water quality or WFD protected areas associated with the North Wales or Dee water bodies. The activity is not anticipated to significantly impact any element within these water bodies and the ability of these water bodies to achieve good status in the future is likely to be secure. The construction, operation and maintenance and decommissioning of the Proposed Development is therefore considered to be compliant with the requirements of the WFD.

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