HyNet North West

MARINE LICENCE APPLICATION

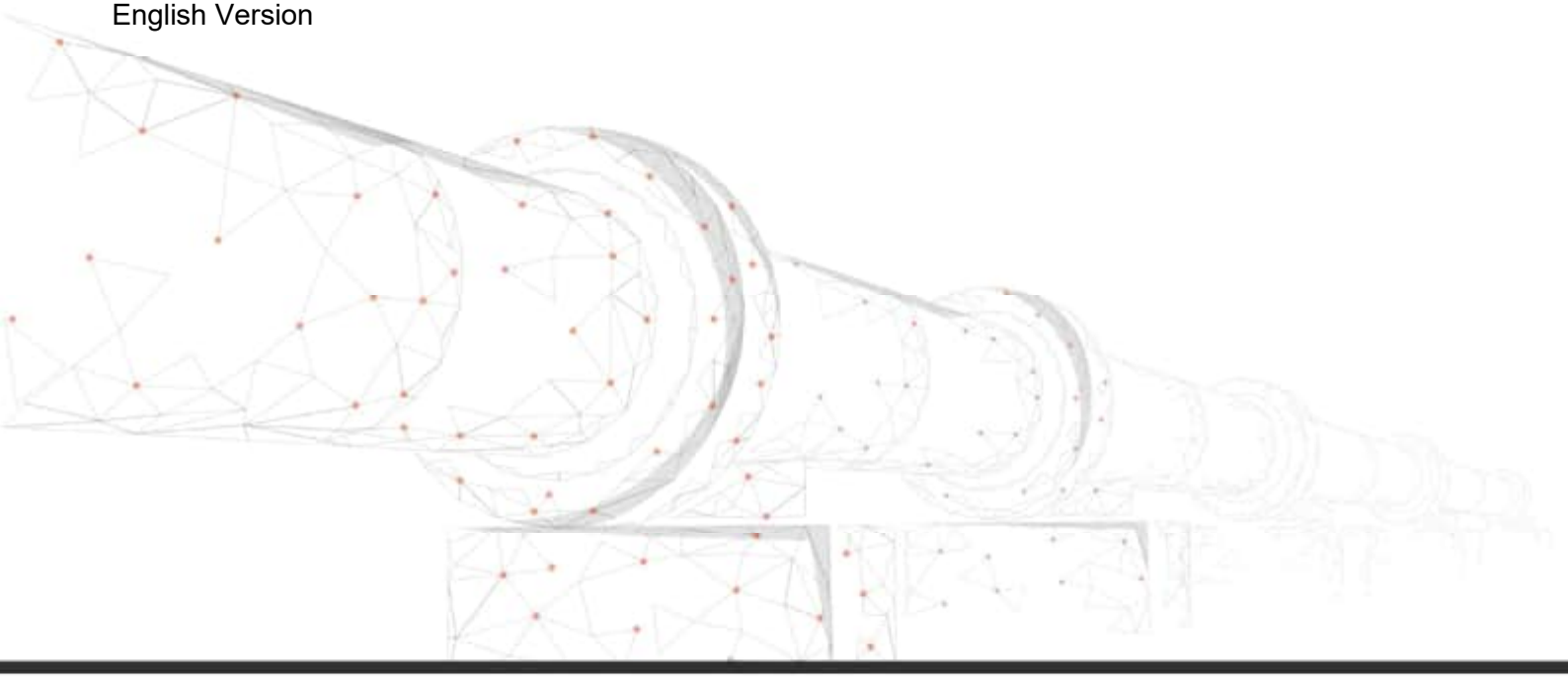
Water Framework Directive Assessment

HyNet Newbuild Carbon Dioxide Pipeline – Trenchless crossing of the River Dee

Part 4 of the Marine and Coastal Access Act 2009 (MCAA)

Applicant: Liverpool Bay CCS Limited

English Version



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1. INTRODUCTION

1.1. OVERVIEW

1.1.1. This Water Framework Directive assessment (WFDa) has been prepared in support of the Marine Licence application for the trenchless crossing of the River Dee, below Mean High Water Springs (MHWS), by the newbuild carbon dioxide pipeline (the Proposed Development). These works are also included in the WFDa for the HyNet Carbon Dioxide Pipeline Development Consent Order (DCO) Application, as they form part of that larger project.

1.1.2. The trenchless crossing of the River Dee has been assessed against the biological, physico-chemical, and hydromorphological quality elements that comprise the WFD. The purpose of this WFDa is to evaluate the potential operational effects on those WFD water bodies potentially impacted due to the Proposed Development. This includes potential effects to River, Transitional, Artificial, and Groundwater WFD water bodies.

1.1.3. The potential construction impacts are also evaluated due to the potential medium to long-term effects they may have on the status of WFD quality elements.

1.2. STUDY AREA

1.2.1. The trenchless crossing works will be carried out under the River Dee and Bala Lake /Afon Dyfrdwy A Llyn Tegid Special Area of Conservation (SAC) and the study area spans the corresponding works description from the main HyNet Carbon Dioxide Pipeline DCO Application, which is described as:

> *"From the A548 Sealand Road, the section continues south westerly to cross the River Dee (Afon Dyfrdwy) and North Wales Coast Railway Line before turning west."*

1.2.2. The Study Area and drawings of the Proposed Development are provided in **Figure 1.1 – WFD Waterbodies.**

1.2.3. The Proposed Development could potentially impact those WFD water bodies listed in **Table 1-1.**

Table 1.1: WFD water bodies within Wales potentially impacted by the Proposed Development

River Basin District	Management Catchment	Operational Catchment	WFD Water Body
Transitional WFD Water Bodies			
Dee	Dee TraC	Dee Estuary TraC	Dee (N.Wales) (GB531106708200)
Groundwater WFD Water Bodies			
Dee	Dee GW	Dee Carboniferous Coal Measures	Dee Carboniferous Coal Measures (GB41102G204800)
		Dee Permo-Triassic Sandstone	Dee Permo-Triassic Sandstone (GB41101G202400)

1.3. THE PROPOSED DEVELOPMENT

1.3.1. The pipeline crossing of the River Dee will be carried out using a trenchless crossing technique, either micro-tunnelling or Horizontal Directional Drilling (HDD). The trenchless crossing of the River Dee (Afon Dyfrdwy) is identified as **TRS-28** within the main DCO ES and has been proposed to prevent disruption to the River Dee. For both trenchless techniques the following parameters would apply:

- The entry and exit pits for the trenchless crossing will be sited a minimum of 16 m away from the transitional (tidal) waters (and any defence structures on that watercourse).
- The compounds for the entrance and exit pits for micro-tunnelling would be approximately 30x30m and 20x20m.
- The compounds for the entrance and exit pits for HDD would be approximately 50x50m and 30x30m.
- The trenchless crossing depth below river bed would be a minimum of 8m for micro-tunnelling, and a minimum of 15m for HDD.
- Up to four weeks working for both micro-tunnelling and for HDD.

1.3.2. The marine licensable activities associated with the Proposed Development relate only to those elements that will be carried out and installed below Mean High Water Springs (MHWS). For the Proposed Development this would be the approximately 75 m in length bored section of pipe installed below the River Dee between the MHWS mark on each bank. However, for completeness, and context, the works required for the entry and exit pits, and the whole length of

the pipe connection between them, have been described in this section. This is because the anticipated effects of the Proposed Development on the WFD water bodies are intrinsically linked to these connected activities. Additional details of the HDD and Micro-Tunnelling installation techniques is presented in the **Environment Report** at **Section 2: Proposed Development**.

1.3.3. For the trenchless crossing of the River Dee, the following activities are required:

CONSTRUCTION STAGE

Trenchless Crossings

1.3.4. The Proposed Development will be laid beneath the River Dee watercourse via trenchless crossing techniques. These techniques use a machine to drill or 'bore' a hole through the ground from one side of a specific feature (for example, major roads) to the other. Typically, a pit is dug at either end of the trenchless section where the machinery will be located, creating an entrance and exit pit. All entrance and exit pits will be returned to original use following completion of the construction process.

1.3.5. There are various methods of trenchless installation available. The choice of technique will be confirmed at the Detailed Design stage and is dependent on a number of site-specific factors including ground conditions, topography, the space available for pipe stringing either side of the obstruction, and the sensitivity of the obstruction to potential settlement.

1.3.6. HDD and Micro-Tunnelling are the two types of trenchless installation techniques most likely to be utilised for the River Dee crossing by the construction contractor(s) once the Detailed Design has been completed.

Vegetation Clearance

1.3.7. Riparian vegetation clearance would be limited as far as practicable to the immediate areas of construction to permit the execution of works, outside of the riparian zone, at least 16m from the transitional waters. Vegetation would be reinstated post-construction as far as practicable. Vegetation clearance is, however, not expected to occur within the River Dee (N.Wales) WFD surface water body.

Temporary Construction Compounds

1.3.8. Temporary Construction Compounds to accommodate construction works are expected to be set out adjacent to the Dee (N. Wales) WFD surface water body.

Hydrostatic Testing

1.3.9. Following installation of the Proposed Development, pre-commissioning activities of the pipeline system would determine the structural integrity of the pipeline.

1.3.10. The pipeline will be cleaned and gauged to remove construction debris and check that the tested section is free of deformations or obstructions. Hydrostatic testing will then be undertaken. This involves filling the pipeline in sections with water which is then pressurised to test the line for leaks.

1.3.11. The source of the water will be from either a commercial standpipe, water tanker, new water abstraction or, where practicable, water re-used from previously tested sections to reduce the total water use.

1.3.12. The total expected volume of water required for hydrostatic testing is approximately 720m^3 of water per kilometre of pipeline.

1.3.13. Following hydrostatic testing, the water will be quality tested, then discharged to either a designated watercourse, public sewer via a temporary surface water pipe, or road tanker to an offsite registered disposal site. The viability of each discharge option will be assessed at various locations along the pipeline route and relevant discharge licences obtained.

1.3.14. The pipeline will then be dried by using super dry air, nitrogen or by vacuum drying. The pipeline will then be pressured by super dry air or nitrogen and maintained at this pressure until commissioning.

Construction Environmental Management Plan

1.3.15. An **Outline Construction Environmental Management Plan (OCEMP)** and a **Register of Environmental Actions and Commitments (REAC)** accompany the Marine Licence application and contain the mitigation relied on to manage the environmental impacts of the Proposed Development. The **OCEMP** and **REAC** have been written in support of the wider HyNet Carbon Dioxide Pipeline Development Consent Order (DCO) Application. Notwithstanding, these documents include best practise measures that will be adopted project-wide in the Construction Stage so that impact to the water environment is reduced. This includes best practise measures at the trenchless crossing of the River Dee.

OPERATION STAGE

1.3.16. Carrying out a trenchless crossing under the River Dee will avoid a direct interface with the marine environment. Notwithstanding, mitigation measures, relevant to the protection of the marine environment that will be applied when carrying out these works, are captured within the **REAC** and would be secured and implemented within the **OMEMP**.

DECOMMISSIONING ACTIVITIES

1.3.17. The Proposed Development is permanent, but its useful life is linked to the capacity of the offshore reservoirs, where the carbon dioxide will be transported for permanent geological storage. The Proposed Development is designed to a life span of 40 years. When the Proposed Development ceases to be operational and reaches the end of its useful life, it will be decommissioned

safely, filled with nitrogen, and left in-situ. The basis of assessment for operational life in the WFDa is 25 years, which reflects the anticipated time by which the geological storage site will reach capacity.

1.3.18. During the decommissioning stage a Decommissioning Environmental Management Plan (DEMP) will be prepared and adopted that would control potential impacts, which are anticipated to be similar to those that may occur during the Construction Stage.

1.4. ENGAGEMENT

1.4.1. A consultation meeting between the Applicant and the Natural Resources Wales's Geomorphology and Biodiversity Technical Specialists was held on the 14 March, 25 May, and 19 July 2022. Minutes of these consultation meetings are provided in **Annex A**.

1.4.2. An initial consultation meeting between the Applicant and Biodiversity Technical Specialists from Natural Resources Wales and Natural England was held on 3 February 2021, where survey approaches and methodologies for surveying aquatic receptors was presented for discussion and comment. Following this, another consultation meeting was held on 19 November 2021 between the Applicant and Biodiversity Technical Specialists/representatives from Natural Resources Wales, Natural England, and Flintshire County Council to discuss the approach to survey and assessment of aquatic receptors associated with the River Dee. Here, two potential options were presented; 'Do Nothing Approach', using desk-study information alone, and a 'Survey Approach' utilising appropriate surveys and methods. Potential mitigation measures were also tabled. A number of concerns were raised including: the presence of otter along the River Dee; timing of drilling in regard to fish movement; appropriate licences for survey work such as sediment grabs; potential maintenance requirements; impacts associated with blowouts/frac outs from HDD; and decommissioning. Following the meeting, Natural Resources Wales provided their written opinion, recommending the 'Survey Approach' be taken forward.

1.4.3. Email correspondence between the Applicant and Natural Resources Wales, was undertaken on 6 April 2022 (see the attachment 12a from Marine License Application). This was to ensure specific concerns for key aquatic receptors and potential invasive non-native species (INNS) for watercourse crossings were addressed and agreed, such that suitable avoidance and mitigation methods can be implemented to reduce risk of harm to a reasonable and acceptable level. A spreadsheet, detailing watercourse crossings and the proposed crossing design/type, was provided by the Applicant to Natural Resources Wales. Natural Resources Wales' response provided key aquatic receptors for each watercourse crossing, and the potential for INNS at specific watercourses crossings.

1.5. BACKGROUND TO THE WFD

1.5.1. An impact assessment of any works/modifications to water bodies in the UK is required under the European Union's Water Framework Directive (2000/60/EC) (**Ref. 1.1**). The WFD is transposed into law in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the 2017 Regulations) (SI 2017/407) (**Ref. 1.2**). For groundwater, the WFD is transposed into the policy paper The Groundwater (Water Framework Directive) (England) Direction 2016 (**Ref. 1.3**). Given that the trenchless crossing of the River Dee is part of a larger DCO development, the WFDa process also needs to follow the Planning Inspectorate Guidance Note 18: The Water Framework Directive (**Ref. 1.4**). Compliance with the WFD legislation is required for Marine Licencing of the trenchless crossing of the River Dee.

1.5.2. The WFDa should also comply with relevant CEN/ISO Standards (**Ref. 2.15 to Ref. 2.21**), as stated within Annex V of the WFD legislation. Relevant standards are listed within **Section 2 (Methodology).**

1.5.3. The primary aim of the WFD is to improve/maintain the Ecological Status/Potential of all water bodies and to prevent deterioration in status of the water bodies and their associated WFD quality elements. Ecological Status/Potential is determined by a suite of biological, physico-chemical, and hydromorphological quality elements. This WFDa aims to establish the baseline conditions, evaluate potential impacts of the Proposed Development and assess compliance against WFD objectives.

1.5.4. The overarching objective of the WFD is for surface water bodies in Europe to attain overall 'Good Ecological Status' (GES) or 'Good Ecological Potential' (GEP). GES refers to situations where the ecological characteristics show only a slight deviation from natural/near natural conditions. In such a situation, the biological, chemical, physico-chemical, and hydromorphological conditions are associated with limited or no human pressure. Artificial and heavily modified water bodies have a target to achieve GEP, which recognises their important uses, whilst ensuring the quality elements are protected as far as possible.

1.5.5. The WFD sets several objectives including:

- Prevent deterioration in status for water bodies;
- Aim to achieve good biological and good surface water chemical status in water bodies. For those water bodies that did not achieve GES by 2015, alternative objectives have been set by Natural Resources Wales where water bodies have been allocated a target date for compliance of either 2021 or 2027. The target date set for each water body takes into consideration measures that are practicably achievable for achieving GES or GEP;

- For water bodies that are designated as artificial or heavily modified, the objective is to achieve GEP. Those artificial/heavily modified water bodies that did not achieve GEP by 2015 need to achieve compliance by 2021 or 2027;
- Where is it considered either technically infeasible or disproportionately expensive to achieve GES or GEP by 2021 or 2027, alternative objectives have been set for the water body, such as a target to achieve Moderate status;
- Comply with objectives and standards for protected areas, where relevant; and,
- Reduce pollution from priority substances and cease discharges, emissions and losses of priority hazardous substances.

1.5.6. Where a new modification, change in activity, or change to a structure on a water body is proposed, a WFDa needs to consider whether the proposed alteration would cause deterioration in the Ecological Status or Potential of any water body. For heavily modified/artificial water bodies, proposed new modifications, or changes to activities or structures, may also result in WFD mitigation measures or actions, set to help a water body achieve GES/GEP, being ineffective. This could result in the water body failing to meet GES/GEP. Where a WFDa concludes that deterioration or failure to achieve GES/GEP may occur, an Article 4.7 assessment would be required, which makes provision for deterioration of status provided that certain stringent conditions are met.

2. METHODOLOGY

2.1. DATA COLLECTION

DESK STUDY

2.1.1. A desk-based study was carried out to inform the WFDa, reviewing the existing information for the Proposed Development and Study Area to develop a baseline for the River Dee and surrounding areas. The following data sources were used for the desk study:

- Contemporary OS maps;
- Geology and soil maps (**Ref. 2.1**);
- Current aerial photography;
- WFD status and objectives from Catchment Data Explorer (**Ref. 2.2**);
- WFD status and objectives from Water Watch Wales (**Ref. 2.3**);
- Environment Agency Environment Agency's Ecology and Fish Data Explorer (**Ref. 2.4**);
- Environment Agency Water Quality Archive (**Ref. 2.5**);
- Historical maps (**Ref. 2.6**);
- Nature on the Map for designated areas, habitats and species, and landscape data **(Ref. 2.7**);
- Hydrological data **(Ref. 2.8**); and,
- WFD status and objectives from the 2015 Western Wales (**Ref. 2.9**), Dee **(Ref. 2.10**).

2.2. FIELD SURVEY

HYDROMORPHOLOGY SURVEYS

2.2.1. Hydromorphology surveys were conducted, and data analysed in compliance with the CEN standards for hydromorphology (**Ref. 2.12 and Ref. 2.13)**.

2.2.2. Hydromorphology walkover surveys were carried out on 13 and 14 October 2021 and 2 and 3 November 2021. The purpose of these surveys was to characterise the baseline hydromorphological conditions of the River Dee potentially impacted by the HyNet Carbon Dioxide Pipeline trenchless crossing.

2.2.3. Data collected from these walkover surveys was used, not only to inform this WFDa, but also to inform the design development process. The data aided the elimination of potential impacts through design and the reduction of potential impacts where practicable. For example, where practicable, set-backs from river bank top were changed due to hydromorphological sensitivity observed on site.

2.2.4. The data collected was therefore used to comply with the 'eliminate, reduce, manage, and enhance' stepwise approach to WFD and biodiversity assessment.

RIVER CONDITION ASSESSMENT

2.2.5. River Condition Assessment (RCA) was conducted by accredited professionals using the standard RCA field methodology (MoRPh5) (**Ref. 2.14**). MoRPh5 surveys were undertaken on the River Dee within the Newbuild Infrastructure Boundary. Surveys were undertaken during April and May 2022.

2.2.6. Additional MoRPH5 surveys were undertaken on 16 and 17 June 2022 due to the inclusion of outfalls as part of the drainage strategy.

2.2.7. The results of the MoRPh5 surveys were used to generate a river condition value.

AQUATIC ECOLOGY SURVEYS

2.2.8. The aquatic ecology surveys, sampling and analysis are undertaken in accordance with the following CEN standards, as required by Annex V of the WFD legislation:

- CEN EN ISO 8689-2000 Water Quality - Biological classification of rivers - Part 1: Guidance on the interpretation of biological quality data from surveys of benthic macroinvertebrates (**Ref. 2.15**).
- CEN EN ISO 8689-2:2000 Water Quality - Biological classification of rivers - Part 2: Guidance on the presentation of biological quality data from surveys of benthic macroinvertebrates (**Ref. 2.16**).
- CEN EN 17136:2019 Water Quality – Guidance on field and laboratory procedures for quantitative analysis and identification of macroinvertebrates from inland surface waters (**Ref. 2.17**).
- CEN EN ISO 10870:2012 Water quality - Guidelines for the selection of sampling methods and devices for benthic macroinvertebrates in fresh waters (**Ref. 2.18**).
- CEN EN 14184:2014 Water quality - Guidance for the surveying of aquatic macrophytes in running waters (**Ref. 2.19**).
- CEN EN 14962:2006 Water quality - Guidance on the scope and selection of fish sampling methods (**Ref. 2.20**).
- CEN EN 14011:2003 Water Quality – Sampling of fish with electricity (**Ref. 2.21**).

Aquatic Habitat Walkover Surveys

2.2.9. Aquatic habitat walkover assessments were conducted between April 2021 and April 2022. Assessments were conducted to scope the potential of aquatic

habitat and species receptors up to 100m up and downstream of the proposed crossing point, and to inform the need for further aquatic ecology surveys.

2.2.10. The potential for the River Dee to support legally protected and/or notable aquatic species was assessed through field observations of various channel and bank characteristics.

Fish Surveys

Electric Fishing

2.2.11. The River Dee was identified to provide suitable fish habitat during the aquatic habitat walkover surveys, and therefore scoped in for fish population assessment.

2.2.12. The fish population of the River Dee was intended to be assessed using quantitative electric fishing survey methods. However, due to health and safety risks and access limitations, electric fishing could not be carried out.

Environmental-DNA (e-DNA)

2.2.13. As electric fishing surveys could not be safely conducted on the River Dee, assessment of fish species present was determined through the collection and analysis of environmental-DNA (e-DNA). e-DNA is deoxyribonucleic acid (DNA) that is collected from the environment in which an organism lives, rather than directly from the plants or animals themselves.

2.2.14. Samples of e-DNA were collected from the River Dee watercourse between 16 February 2022 and 01 June 2022. The e-DNA samples were taken by suitably trained staff in order to minimise the possibility of cross contamination and ensure that representative samples were collected. Samples were collected using NatureMetrics' standard operating procedure, which is consistent with the current draft of the BS EN/ISO Water sampling for capture of macrobial environmental DNA in aquatic environments guidance (**Ref. 2.26**).

Aquatic macroinvertebrate sampling

2.2.15. Aquatic macroinvertebrate surveys were undertaken at the River Dee by suitably qualified and experienced aquatic ecologists. Sampling was undertaken in either Spring 2021, Autumn 2021, or Spring 2022.

2.2.16. Samples were collected using either standard three-minute kick sampling, or standard three-minute sweep sampling of all in-channel habitats in proportion to their occurrence, using a standard sampling net (1mm mesh), with a one-minute timed hand search following the Environment Agency procedure (**Ref. 2.27**). This methodology conforms to the CEN/ISO Water quality guidance for the selection of sampling methods and devices for benthic macroinvertebrates in fresh waters (**Ref. 2.28**).

2.2.17. A standardised field sheet was completed to include details of channel and bank physical habitat (material of banks and substrates, flow types, physical processes, bank structure), riparian land use and potential sources of anthropogenic stress.

2.2.18. Samples were placed in one-litre sample pots, preserved in Industrial Denatured Alcohol (IDA) on site and transported to the laboratory for sorting and identification to Taxonomic Level 5, in adherence with Environment Agency procedures (**Ref. 2.29**).

2.2.19. Analysis of aquatic macroinvertebrate biological metrics allowed the assignation of ecological values to the aquatic macroinvertebrate communities recorded and an assessment of pressures on those communities to be made. The context and applicability of each metric is detailed in the **Appendix 9.9 - Aquatic Ecology (Volume III).**

2.3. WFD ASSESSMENT PROCESS

2.3.1. The assessment methodology used here is based on guidance provided by the Planning Inspectorate Advice Note 18: The Water Framework Directive (**Ref. 2.31**). This guidance outlines a three-stage process to WFDa: screening, scoping, and impact assessment.

STAGE 1: SCREENING

2.3.2. Screening is required to identify activities that have the potential to result in deterioration of a water body or fail to comply with the objectives of that water body. Screening also serves to identify those proposed activities (e.g., proposed construction methods) that should be taken through to scoping, and those activities that are unlikely to result in the deterioration of the water body, and can, therefore, be screened out from further assessment.

STAGE 2: SCOPING

2.3.3. Scoping is required to identify risks to receptors from a project's activities, based on the relevant water bodies and their water quality elements (including information on status, objectives, and the parameters for each water body). Potential risks to hydromorphology, biology (habitats, fish, invertebrates, macrophytes and phytoplankton), water quality, WFD protected areas and invasive non-native species should be assessed. The scoping stage identifies those elements that need to be carried forward to Stage 3.

STAGE 3: IMPACT ASSESSMENT

2.3.4. Where assessment has been considered necessary at scoping stage, an impact assessment is carried out for each receptor identified as being at risk in terms of potential deterioration or non-compliance with its specific objectives as set out in the River Basin Management Plan as a result of the Proposed Development.

Where the potential for deterioration of water bodies is identified, and it is not possible to mitigate the impacts to a level where deterioration can be avoided, the Proposed Development would need to be assessed in the context of Article 4(7) of the WFD.

2.3.5. Whilst the assessment of potential construction impacts is not required as part of a WFDa, these impacts may have detrimental impacts on the WFD quality elements and construction periods may sometimes be of long duration (i.e., several years). Thus, construction impacts are considered, along with mitigation to reduce or eliminate potential impacts on the water body and WFD quality elements.

COASTAL AND TRANSITIONAL WFD WATER BODIES

2.3.6. For coastal and transitional WFD water bodies, the Environment Agency guidance for assessing estuarine and coastal waters was followed (**Ref. 2.32**).

2.4. LIMITATIONS AND ASSUMPTIONS

2.4.1. The River Condition Assessment (RCA) covers at least 20% of the watercourse length within the Newbuild Infrastructure Boundary, as stated in the stablished methodology (**Ref. 2.14**). Therefore, the surveyed section is assumed to be representative of the overall watercourse within the Newbuild Infrastructure Boundary.

2.4.2. The ground investigation performed to inform the Preliminary Design included limited spatial coverage of groundwater monitoring points. BGS historic borehole records were used to supplement the GI data, however, this historic data may not be representative of current conditions.

2.4.3. Channel profiles, steep banks and bankside vegetation cover constrained access to many watercourses such that a complete and comprehensive survey to inform the fish community baseline was not possible. Netting techniques would have similarly been constrained through the physical dimensions and character of these watercourses. Moreover, several watercourses posed clear health and safety risks for wading-based electric fishing surveys. In order to gain a better understanding of the fish populations of these watercourses, water samples were taken for those sites identified as having suitable fish habitat and analysed for fish DNA against an extensive reference library.

2.4.4. Three invertebrate samples were taken outside of the traditional sampling seasons. Surveys were conducted in early June only two weeks outside of the sampling season. Such surveys were to confirm the presence and/or likely absence of species of conservation interest, and as such, the results of these surveys are likely to remain valid.

2.4.5. The invertebrate sampling methods used were selected to provide the data necessary for the calculation of a range of biological quality indices. It was not

intended that the sampling methods would capture a full list of all species present within the water body, which would vary according to season and abundance of individual species. Identification to species level was not always possible where juvenile or damaged specimens were present in the sample or were not identified to species level as standard. Nevertheless, through the calculation of appropriate indices, it was possible to evaluate the biological quality of the water body in relation to others.

2.4.6. Macrophyte surveys were conducted outside of the optimum survey window. As such, the results of these surveys are likely to be limited by restricted macrophyte growth and the absence of flowers used in identification. However, macrophyte surveys were conducted as a precautionary measure, with no optimum habitat being identified during the aquatic habitat walkover surveys or consequent macrophyte surveys. Therefore, it is unlikely that the assessed ecological baseline would differ if surveys were conducted in the appropriate season.

3. WFD SCREENING AND SCOPING

3.1. STAGE 1: WFD SCREENING

3.1.1. The purpose of the WFD screening stage is to identify the extent to which the trenchless crossing of the River Dee may affect WFD water bodies that lie within the zone of influence of the Proposed Development.

SCREENING OF WATER BODIES

3.1.2. The screening of the WFD water bodies potentially affected by the Proposed Development is presented in **Table 3.1**. This includes rivers, artificial, coastal, transitional, and groundwater bodies. Activities relating to the construction and operation of the Proposed Development have been assessed in terms of their potential impact on those water bodies.

Table 3.1: Screening of WFD water bodies within the Newbuild Infrastructure Boundary

WFD Water body (ID)	Type	Screened in or out?	Justification
Dee (N. Wales) (GB531106708200)	Transitional	In	The Dee would be crossed by the Proposed Development.
North Wales (GB641011650000)	Coastal	Out	No works are proposed within or immediately upstream of this coastal water body.
Dee Permo-Triassic Sandstone (GB41101G202400)	Groundwater	In	The Proposed Development passes through this groundwater body.
Dee Carboniferous Coal Measures (GB41102G204800)	Groundwater	In	The Proposed Development passes through this groundwater body.

SCREENING OF ACTIVITIES

3.1.3. The Proposed Development comprises construction, operation, and decommissioning activities described in **Section 1.3**. The screening process of these activities is presented in **Table 3.2**.

3.1.4. Those activities screened in for further assessment in **Table 3.2** are carried forward to Stage 2: Scoping. Those activities screened out of further assessment are not considered further.

Table 3.2: Screening of activities

Activity	Screened in or out?	Justification
Construction Stage		
Trenchless crossings	In	The pipeline crossing of the River Dee will be carried out using a trenchless crossing technique, either micro-tunnelling or HDD, which could create vibration that impacts fish populations, and potential chemical, and artificial light pollution that could impact the biological quality of the watercourse. The Dee (N.Wales) water body is assessed for this activity.
Vegetation clearance	Out	Vegetation clearance is not expected to occur within the River Dee. Riparian vegetation clearance would be limited as far as practicable to the immediate areas of construction to permit the execution of works, outside of the riparian zone, at least 16m from the transitional waters. Vegetation would be reinstated post-construction as far as practicable. The Dee (N.Wales) water body is not assessed for this activity
Dewatering	In	Temporary increased flows within receiving watercourse could affect the physico-chemical and hydromorphological quality of the watercourse. This activity is screened out for groundwater given that impacts would be temporary in nature only, with no long-term impacts on the WFD groundwater body. However, the Dee (N.Wales) surface water WFD water body could be impacted by this activity. The Dee (N.Wales) water body is assessed for this activity
Hydrostatic Testing	In	Testing the newly installed Proposed Development could produce water leaking and ultimately impact the floodplain and in-channel dynamics. The Dee (N. Wales) surface water WFD water body could be potentially impacted by this activity. The Dee (N.Wales) water body is assessed for this activity
Operation Stage		
Drainage, attenuation ponds and outfalls	In	Attenuation ponds are proposed as part of the drainage strategy. These would include treatment trains and new outfalls to the watercourse. The new surface water outfalls and associated discharge could affect hydromorphological, chemical and biological quality of the receiving watercourse. The Dee (N.Wales) water body is assessed for this activity
Decommissioning activities	Out	Potential impacts from temporary works are expected to be managed by the implementation of measures within the DEMP. The Dee (N.Wales) water body is not assessed for this activity

3.2. STAGE 2: WFD SCOPING

3.2.1. The WFD scoping stage defines the level of detail required for further WFD assessment. This includes identifying risks to the WFD receptors from the Proposed Development's activities. The scoping of WFD quality elements for Construction Stage activities is presented in **Table 3.3** for all surface, transitional, and coastal WFD water bodies. The scoping of WFD scoping of quality elements for the Operational Stage is presented in **Table 3.4** for all surface, transitional, and coastal WFD water bodies.

3.2.2. The groundwater scoping stage assessment is presented in **Table 3.5** and **Table 3.6** for the Dee Permo-Triassic Sandstone (GB41101G202400), Dee Carboniferous Coal Measures (GB41102G204800) groundwater WFD water bodies.

Table 3.3: Scoping of surface, transitional, and coastal WFD quality elements for Construction Stage activities

WFD Quality Element	Activities	
	Trenchless crossings	**Hydrostatic testing**
	Water bodies	
	Dee (N.Wales)	*Dee (N.Wales)*
Surface water / Transitional / Coastal		
Biological		
Fish	**In** – Trenchless crossings can potentially impact this element.	**In** – Hydrostatic testing can potentially cause alterations to this element.
Invertebrates	**In** – Trenchless crossings can potentially impact this element within Dee (N.Wales) water bodies only.	**In** – Hydrostatic testing can potentially cause alterations to this element.
Macrophytes & Phytoplankton	**Out** – Trenchless crossings is not impacting this element.	**In** – Hydrostatic testing can potentially cause alterations to this element.
Surface water		
Physico-Chemical		
Thermal Conditions	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**In** – Hydrostatic testing can potentially cause alterations to this element.

WFD Quality Element	Activities	
	Trenchless crossings	Hydrostatic testing
	Water bodies	
	Dee (N.Wales)	*Dee (N.Wales)*
Oxygenation Conditions	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**In** – Hydrostatic testing can potentially cause alterations to this element.
Salinity	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**In** – Hydrostatic testing can potentially cause alterations to this element.
Acidification Status	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**In** – Hydrostatic testing can potentially cause alterations to this element.
Nutrient Conditions	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**In** – Hydrostatic testing can potentially cause alterations to this element.
Priority Hazardous Substances	**In** – Trenchless crossings can potentially impact this element.	**In** – Hydrostatic testing can potentially cause alterations to this element.
Hydromorphological		
Quantity and Dynamics of Flow	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**In** – Hydrostatic testing can potentially cause alterations to this element.
Connection to Groundwater	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**Out** – Hydrostatic testing is not expected to cause alterations to this element.
River Continuity	**Out** –– Trenchless crossings are not expected to cause alterations to this element.	**Out** – Hydrostatic testing is not expected to cause alterations to this element.
River Depth and Width Variation	**Out** –Trenchless crossings are not expected to cause alterations to this element.	**Out** – Hydrostatic testing is not expected to cause alterations to this element.
Structure and Substrate of the River Bed	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**Out** – Hydrostatic testing is not expected to cause alterations to this element.
Structure of the Riparian Zone	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**Out** – Hydrostatic testing is not expected to cause alterations to this element.

WFD Quality Element	Activities	
	Trenchless crossings	Hydrostatic testing
	Water bodies	
	Dee (N.Wales)	*Dee (N.Wales)*
Transitional / Coastal		
Physico-Chemical		
Transparency	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**In** – Hydrostatic testing can potentially cause alterations to this element.
Thermal Conditions	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**In** – Hydrostatic testing can potentially cause alterations to this element.
Oxygenation Conditions	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**In** – Hydrostatic testing can potentially cause alterations to this element.
Nutrient Conditions	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**In** – Hydrostatic testing can potentially cause alterations to this element.
Priority Hazardous Substances	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**In** – Hydrostatic testing can potentially cause alterations to this element.
Hydromorphological		
Depth Variation	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**Out** – Hydrostatic testing is not expected to cause alterations to this element.
Quality, Structure and Substrate of the Bed	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**Out** – Hydrostatic testing is not expected to cause alterations to this element.
Structure of the Intertidal Zone	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**Out** – Hydrostatic testing is not expected to cause alterations to this element.
Freshwater Zone	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**Out** – Hydrostatic testing is not expected to cause alterations to this element.
Wave Exposure	**Out** – Trenchless crossings are not expected to cause alterations to this element.	**Out** – Hydrostatic testing is not expected to cause alterations to this element.

Table 3.4: Scoping of surface, transitional, and coastal WFD quality elements for the Operational Stage

WFD Quality Element	Activities
	Drainage and outfalls
	Water bodies
	Dee (N. Wales)
Surface water / Transitional / Coastal	
Biological	
Fish	**In** – Drainage and outfalls could potentially impact this element.
Invertebrates	**In** – Drainage and outfalls could potentially impact this element.
Macrophytes & Phytoplankton	**Out** – Drainage and outfalls is not expected to cause alterations to this element.
Surface water	
Physico-chemical	
Thermal Conditions	**In** – Drainage and outfalls can cause alterations to this element.
Oxygenation Conditions	**In** – Drainage and outfalls can cause alterations to this element.
Salinity	**Out** – Drainage and outfalls are not expected to cause alterations to this element.
Acidification Status	**In** – Drainage and outfalls can cause alterations to this element.
Nutrient Conditions	**In** – Drainage and outfalls can cause alterations to this element.
Priority Hazardous Substances	**In** – Drainage and outfalls can cause alterations to this element.
Hydromorphology	
Quantity and Dynamics of Flow	**In** – Drainage and outfalls can cause alterations to this element.
Connection to Groundwater	**Out** – Drainage and outfalls are not expected to cause alterations to this element.
River Continuity	**Out** – Drainage and outfalls are not expected to cause alterations to this element.
River Depth and Width Variation	**Out** – Drainage and outfalls are not expected to cause alterations to this element.
Structure and Substrate of the River Bed	**Out** – Drainage and outfalls are not expected to cause alterations to this element.
Structure of the Riparian Zone	**Out** – Drainage and outfalls are not expected to cause alterations to this element.

WFD Quality Element	Activities
	Drainage and outfalls
	Water bodies
	Dee (N. Wales)
Transitional /coastal	
Physico-chemical	
Transparency	**In** – Drainage and outfalls can cause alterations to this element.
Thermal Conditions	**In** – Drainage and outfalls can cause alterations to this element.
Oxygenation Conditions	**Out** – Drainage and outfalls are not expected to cause alterations to this element.
Nutrient Conditions	**Out** – Drainage and outfalls are not expected to cause alterations to this element.
Priority Hazardous Substances	**In** – Drainage and outfalls can cause alterations to this element.
Hydro-morphological	
Depth Variation	**Out** – Drainage and outfalls are not expected to cause alterations to this element.
Quality, Structure and Substrate of the Bed	**Out** – Drainage and outfalls are not expected to cause alterations to this element.
Structure of the Intertidal Zone	**Out** – Drainage and outfalls are not expected to cause alterations to this element.
Freshwater Zone	**Out** – Drainage and outfalls are not expected to cause alterations to this element.
Wave Exposure	**Out** – Drainage and outfalls are not expected to cause alterations to this element.

Table 3.5: Scoping of groundwater WFD quality elements for Construction Stage activities

WFD Quality Element	Trenchless crossing	Dewatering
Quantitative		
Saline Intrusion	**Out**- Due to temporary nature of the trenchless crossing works, no sustained upward trend of saline intrusion	**Out**- Due to temporary nature of dewatering, no sustained upward trend of saline intrusion
Water Balance	**Out**- Due to temporary nature of trenchless crossing works, no change to overall groundwater balance	**Out**- Due to temporary nature of dewatering, no change to overall groundwater balance
GWDTEs	**Out**- Due to temporary nature of trenchless crossing works, no sustained change of water supply to GWDTE. Identified GWDTE have low groundwater dependency	**Out**- Due to temporary nature of dewatering, no sustained change of water supply to GWDTE. Identified GWDTE have low groundwater dependency
Dependent Surface Water Body	**Out**- Due to temporary nature of trenchless crossing works, no sustained impact on dependent surface water bodies	**Out**- Due to temporary nature of dewatering, no sustained impact on dependent surface water bodies
Chemical		
Drinking Water Protected Area	**Out**- trenchless crossing works not within a Drinking Water Protected area.	**Out**- Dewatering works not within a Drinking Water Protected area.
General Chemical Test	**Out**- No deterioration of water quality due to temporary nature of trenchless crossing works and implementation of CEMP.	**Out**- No deterioration of water quality due to temporary nature of dewatering works and implementation of CEMP.
Chemical GWDTEs	**Out**- The chemical contribution during the trenchless crossing works will not significantly impact the GWDTE. Identified GWDTE have low groundwater dependency	**Out**- The chemical contribution during the dewatering will not significantly impact the GWDTE. Identified GWDTE have low groundwater dependency
Chemical Dependent Surface Water Body Status	**Out**- Due to temporary nature of trenchless crossing works, no sustained chemical impact on dependent surface water bodies	**Out**- Due to temporary nature of dewatering, no sustained chemical impact on dependent surface water bodies

WFD Quality Element	Trenchless crossing	Dewatering
Saline Intrusion	**Out**- Due to temporary nature of the trenchless crossing works, no sustained upward trend of saline intrusion	**Out**- Due to temporary nature of the dewatering, no sustained upward trend of saline intrusion

Table 3.6: Scoping of groundwater WFD quality elements for the Operational Stage

WFD Quality Element	Drainage and Outfalls
Quantitative	
Saline Intrusion	**Out**- No impact on saline intrusion
Water Balance	**Out**- Would not result in a significant change to groundwater balance
GWDTEs	**Out**- Would not result in a sustained change of water supply to GWDTE. Identified GWDTE have low groundwater dependency
Dependent Surface Water Body	**Out**- No change is expected to the dependency of surface water bodies on groundwater
Drinking Water Protected Area	**Out**- No infrastructure within a Drinking Water Protected area.
Chemical	
General Chemical Test	**Out**- No deterioration of groundwater body quality is expected from drainage and outfalls due to pollution control and SUDs design
Chemical GWDTEs	**Out**- The chemical contribution of drainage and outfalls will not significantly impact GWDTE. Identified GWDTE have low groundwater dependency.
Chemical Dependent Surface Water Body Status	**Out**- No change chemically is expected to the dependency of surface water bodies on groundwater.
Saline Intrusion	**Out**- No impact on saline intrusion.

3.2.3. The scoping of the WFDa of transitional and coastal water bodies uses the methodology provided by the Environment Agency (**Ref. 2.32**) and the scoping results are presented in **Annex B**. A summary of this scope exercise is presented in **Table 3.7**.

Table 3.7: Summary of Scoping of transitional/coastal water bodies

Receptor	Potential Risk to receptor?	Note the potential impacts to be assessed
Dee (N. Wales) Transitional (GB531106708200)		
Hydromorphology	No	The trenchless crossing techniques have been chosen because they avoid activities within the Dee (N. Wales) water body that could cause impact to the hydromorphology of the water body. No impacts to hydrogeomorphology are, therefore, expected from either the construction or operation phases of the Proposed Development.
Biology: habitat	No	Footprint of Proposed Development activities is less than 0.5km^2, less than 1% of the water body's area, and is not within 500m of a higher sensitivity habitat.
Biology: fish	Yes	Vibration, noise, and water discharges from construction activities.
Water quality	No	The trenchless crossing techniques have been chosen because they avoid activities within the Dee (N. Wales) water body that could cause a release of sediment into the channel, affecting water clarity and nutrients. No impacts to water quality are, therefore, expected from either the construction or operation phases of the Proposed Development.
Protected areas	Yes	Proposed Development is within the River Dee and Bala Lake/Afon Dyfrdwy a Llyn Tegid SAC, SPA, and SSSI
Invasive non-native species	No	The Proposed Development is unlikely to lead to the spread of INNS through construction activities.

4. BASELINE CONDITIONS

4.1.1. **Table 4.1** presents the WFD water body in which the Dee Estuary watercourse is located, the current overall WFD ecological and chemical status, and the River Condition Score, as determined through the surveys and desk study completed in April, May, and June 2022.

4.1.2. Whilst groundwater WFD water bodies were scoped out in **Section 3** above, due to no anticipated impacts to groundwater quality elements, **Table 4.2** presents the overall WFD, quantitative and chemical status for each groundwater body in order to provide some high-level groundwater baseline information. Groundwater is not assessed further, and therefore no detailed groundwater baseline is provided.

4.1.3. A full suite of baseline information for the Dee Estuary watercourse, being carried forward for detailed assessment, is provided in **Annex C**. This presents the baseline data for all WFD quality elements scoped into the assessment for the Dee (N. Wales) water body.

Table 4.1: WFD status of watercourses and surface water bodies screened into this assessment

Watercourse Name	Water body Name and ID	Watercourse Type	Overall Status	Ecological Status	Chemical Status	Overall Objective	River Condition Score
Dee Estuary	Dee (N. Wales) (GB531106708200)	Transitional	Moderate	Moderate	Fail	Good by 2021	Moderate

Table 4.2: WFD status of groundwater bodies screened into this assessment

Groundwater body	Water body ID	Overall Status	Quantitative	Chemical	Overall Objective
Dee Permo-Triassic Sandstone Water Body	GB41101G202400	Poor	Good	Poor	Good by 2015
Dee Carboniferous Coal Measures	GB41102G204800	Poor	Good	Poor	Poor by 2015

5. DETAILED IMPACT ASSESSMENT

5.1. STEP 1: POTENTIAL GENERIC OPERATIONAL IMPACTS OF THE PROPOSED DEVELOPMENT ON WFD QUALITY ELEMENTS

5.1.1. Potential pressures and impacts of the Proposed Development have been identified along with embedded mitigation measures and are presented in **Table 5.1**. The proposed mitigation thus forms the basis of this assessment.

Table 5.1: Pressures, potential impacts and associated mitigation for works to the impacted watercourse and downstream water bodies (Ref. 5.1)

Pressure	Sub-pressure	Potential Impacts	Mitigation Measures
Floodplain modification	Introduction of impermeable areas	Loss of riparian zone/ marginal habitat/ loss of lateral connectivity/ changes to sediment input	Provide enhancements to the riparian zone where practicable to improve connectivity. The Construction Contractor will undertake further consultation with Natural Resources Wales' and the Lead Local Flood Authorities' Planning and Geomorphology Technical Specialists to determine the appropriate depth and extent of the pipeline placement.
Operations and maintenance	Pipes, and outfalls	Hydromorphological alterations of water and sediment inputs through artificial means	Appropriate techniques to align and attenuate flow to limit detrimental effects of these features

5.2. STEP 2: SITE-SPECIFIC ASSESSMENT OF THE PROPOSED DEVELOPMENT AGAINST WFD QUALITY ELEMENTS

5.2.1. Site-specific assessments of the Proposed Development against WFD Quality Elements are summarised below for every activity which may cause a potential impact. The proposed activities with potential impact to the WFD quality elements are trenchless crossing (**Table 5.2**), dewatering (**Table 5.3**), hydrostatic testing (**Table 5.4**), and drainages and outfalls (**Table 5.5**).

5.2.2. The proposed mitigation for potential impacts is provided in the **REAC**, contained in the **OCEMP**, and is summarised in **Section 6.**

Table 5.2: Impact on the WFD Quality elements from trenchless crossing on relevant water bodies

Quality Element	Potential Impact	Mitigation
Relevant water bodies: Dee (N.Wales)		
Surface water and Transitional/Coastal		
Biological		
Macrophytes & Phytoplankton	**Generic Impacts** Trenchless crossing can potentially result in chemical (primarily bentonite) and light pollution, which can cause loss or damage to macrophytes and their habitats.	**Generic Mitigation** Entry and exits pits for the trenchless crossing will be sited a minimum of 16m away from the transitional (tidal) waters (and any defence structures on that watercourse) and backfilled on completion of the works. **OCEMP** will include measures to control pollution, and an appropriate lighting design whereby artificial light does not spill the full width of the watercourse. Therefore, given the localised nature of this activity and implementation of mitigation measures, the impact of trenchless crossings is not expected to cause significant alteration to macrophytes at the WFD water body scale. **Site Specific Mitigation** *River Dee* Alongside generic mitigation, the Proposed Development trenchless crossing depth below river bed would be a minimum of 8m for micro-tunnelling, and a minimum of 15m for HDD. This reduces the likelihood of chemical pollution entering the watercourse as a result of bentonite blowouts. Additionally, due to the tidal characteristics present at the proposed crossing point, and increased buffering capacity of the downstream estuary, the impact of any pollution is likely to be minimal. With this mitigation in place, no significant alteration to macrophytes and phytoplankton is expected at the WFD water body scale.
Invertebrates	**Generic Impacts** Trenchless crossing can potentially result in chemical (bentonite) and light pollution, which can cause loss or damage to invertebrates and their habitats. Dee (N.Wales) water body is potentially impacted during the Construction Stage.	**Generic Mitigation** Entry and exits pits for the trenchless crossing will be sited a minimum of 16m away from the transitional (tidal) waters (and any defence structures on that watercourse) and backfilled on completion of the works. **OCEMP** will include measures to control pollution, and an appropriate lighting design whereby artificial light does not spill the full width of the watercourse. Therefore, given the localised nature of this activity and implementation of mitigation measures, the impact of trenchless crossings is not expected to cause significant alteration to invertebrates at the WFD water body scale. **Site Specific Mitigation** *River Dee* Alongside generic mitigation, the Proposed Development trenchless crossing depth below river bed would be a minimum of 8m for micro-tunnelling, and a minimum of 15m for HDD. This reduces the likelihood of chemical pollution entering the watercourse as a result of bentonite blowouts. Additionally, due to the tidal characteristics present at the proposed crossing point, and increased buffering capacity of the downstream estuary, the impact of any pollution is likely to be minimal. With this mitigation in place, no significant alteration to invertebrates is expected at the WFD water body scale.

Fish	**Generic Impacts**
	
	Trenchless crossing can potentially result in the following impacts during the Construction Stage, which may cause direct damage, disturbance, and the loss, abandonment and/or fragmentation of habitats:
	
	• Chemical pollution, primarily bentonite from blowouts/spillage;
	• Artificial light pollution; and
	• Vibration and noise from micro-tunnelling or HDD.
		Generic Mitigation
		
		The following procedures would be implemented to mitigate the effects of the trenchless crossing:
		
		• Implementation of a Noise and Vibration Management Plan. This is to include a) Utilisation of press or vibratory pile driving methods, b) Soft-starts to pile driving to allow for fish dispersal, and c) Phased or intermittent works schedule (break periods) to allow for recovery windows (**D-BD-057 of the REAC** Measures on Sensitivity (to noise and vibration) of those fish species present, that will be considered to ensure that appropriate construction methods can be implemented to minimise and avoid disturbance or avoidance behaviour. Implementation of a Noise and Vibration Management Plan, to be prepared at the Detailed Design stage, will include, where practicable; soft-starts to pile driving to enable fish dispersal, utilisation of press or vibratory pile driving methods, or bored driving methods and phased or intermittent work schedules (break periods) to allow for windows of fish recovery and movement through the works area.);
		• Entry and exits pits for the trenchless crossing will be sited a minimum of 16m away from the transitional (tidal) waters (and any defence structures on that watercourse) and backfilled on completion of the works;
		• Implementation of the **OCEMP**, which would include pollution control measures, and an appropriate lighting design whereby artificial light does not spill the full width of affected watercourse; and,
		• Where practical and reasonable, timings of works scheduled to avoid sensitive lifecycle stages (migration and spawning) (**D-BD-058 of the REAC**) and measures will include where possible, seasonal timings of works that will aim to avoid risk of impacts to fish populations to account for sensitive life cycle stages (migration and spawning). Where this is not possible, applications for exemptions will be sought from NRW on a case-by-case basis. Seasonal restrictions for consideration are:
		  • 1 October to 31 April - European eel, lamprey and salmonids.
		  • 15 March to 15 June - Coarse fish.
		  • Only upon receipt of granted exemptions and implementation of any necessary required mitigation can works commence.
		
		Therefore, given the localised nature of this activity and implementation of mitigation measures, the impact of trenchless crossings is not expected to cause significant alteration to fish at the WFD water body scale.
		
		Site Specific Mitigation
		
		River Dee
		
		Alongside generic mitigation, the Proposed Development trenchless crossing depth below river bed would be a minimum of 8m for micro-tunnelling, and a minimum of 15m for HDD. This reduces the likelihood of chemical pollution entering the watercourse as a result of blowouts. Additionally, due to the tidal characteristics present at the proposed crossing point, and increased buffering capacity of the downstream estuary, the impact of any pollution is likely to be minimal. The increased depth of the Proposed Development will also reduce the impact of vibration and surface noise on fish, as excavation pits will need to be located at least 16m from the watercourse compared to usual operative depths. Where practical and reasonable, timings of works will be scheduled so not to conflict with the seasonal constraints associated with estuarine environments.
		
		With this mitigation in place, no significant alteration to fish is expected at the WFD water body scale.

Quality Element	Potential Impact	Mitigation
Surface water		
Physico-Chemical		
Oxygenation Conditions	**Generic Impacts** Trenchless crossing can potentially disrupt the hyporheic zone underneath the watercourse, therefore, impacting water and oxygen flow between ground and surface zones during the Construction Stage.	**Generic Mitigation** The trenchless crossing is not expected to cause significant alteration in oxygenation conditions in the WFD watercourse or at the WFD water body scale if the **OCEMP** and correct installation methods are followed. With this mitigation in place, no significant alteration to oxygenation conditions is expected at the WFD water body scale.
Priority Hazardous Substances	**Generic Impacts** Trenchless crossing can potentially disrupt the alluvial sediments underneath the watercourse, hence, releasing hazardous substances to the ground and surface water flow during the Construction Stage.	**Generic Mitigation** The trenchless crossing is not expected to cause significant alteration in Priority Hazardous Substances in any affected watercourse or at the WFD water body scale if the **OCEMP** and correct installation methods are followed. With this mitigation in place, no significant alteration to hazardous substances is expected at the WFD water body scale.
Hydromorphological		
River Continuity	**Site Specific Impacts** No impacts are anticipated on the River Dee WFD water body where trenchless methods are proposed.	No additional mitigation required.
River Depth and Width Variation	**Site Specific Impacts** No impacts are anticipated on the River Dee WFD water body where trenchless methods are proposed.	No additional mitigation required.

DEWATERING

Table 5.3: Impact on the WFD Quality elements from dewatering on relevant water bodies

Quality Element	Potential Impact	Mitigation
Relevant water bodies: Dee (N.Wales)		
Surface water		
Physico-Chemical		
Thermal Conditions	Dewatering can create a dry reach with exposure to higher thermal conditions on the pumped floodplain, and the opposite on the floodplain receiving the water. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourse. Hence, given the localised nature of this activity and the much larger area of the water body, the impact of dewatering is expected to be negligible at the WFD water body scale.
Oxygenation Conditions	Dewatering can increase oxygenation on the pumped floodplain and the opposite effect on the receiving floodplain. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourse. Hence, given the localised nature of this activity and the much larger area of the water body, the impact of dewatering is expected to be negligible at the WFD water body scale.
Salinity	Dewatering can alter existing salt levels on the pumped and receiving floodplains. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourse. Additionally, dewatering would be undertaken using portable pumps to take the water from the trenches/excavations and pump it into mobile containerised tanks. The tanks will have weirs to allow suspended solids and sediment to settle. Regular quality testing of the water will take place after it has passed through the weirs to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of dewatering is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied.
Acidification Status	Dewatering can alter the pH on the pumped and receiving floodplains. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourse. Additionally, dewatering would be undertaken using portable pumps to take the water from the trenches/excavations and pump it into mobile containerised tanks. The tanks will have weirs to allow suspended solids and sediment to settle. Regular quality testing of the water will take place after it has passed through the weirs to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of dewatering is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied.
Nutrient Conditions	Dewatering can alter nutrient conditions on the pumped and receiving floodplains. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourse. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of dewatering is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied.

Quality Element	Potential Impact	Mitigation
Priority Hazardous Substances	Dewatering can increase priority hazardous substances in the floodplain receiving water. Through time, overland erosion can transport those substances to the watercourse. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourse. Additionally, dewatering would be undertaken using portable pumps to take the water from the trenches/excavations and pump it into mobile containerised tanks. The tanks will have weirs to allow suspended solids and sediment to settle. Regular quality testing of the water will take place after it has passed through the weirs to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of dewatering is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied.
Hydromorphological		
Quantity and Dynamics of Water Flow	Floodplain dewatering can alter the base flow and hydraulic connectivity with the open channel flow. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourse. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of dewatering is expected to be negligible at the WFD water body scale.
River Depth and Width Variation	Floodplain dewatering can alter the base flow and hydraulic connectivity with the open channel flow, potentially altering the river depth and width variation. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourse. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of dewatering is expected to be negligible at the WFD water body scale.
Structure and Substrate of the River Bed	Floodplain dewatering can alter the base flow and hydraulic connectivity with the open channel flow, potentially resulting in changes in discharge and in the riverbed characteristics. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourse. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of dewatering is expected to be negligible at the WFD water body scale.
Transitional		
Physico-Chemical		
Transparency	Floodplain dewatering can transfer suspended solids from the pumped floodplain to the receiving one. Therefore, there is a potential to impact the watercourse transparency via overland erosion on the floodplain. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourse. Additionally, dewatering would be undertaken using portable pumps to take the water from the trenches/excavations and pump it into mobile containerised tanks. The tanks would have weirs to allow suspended solids and sediment to settle. Regular quality testing of the water would take place after it has passed through the weirs to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of dewatering is expected to be negligible at the WFD water body scale.

Quality Element	Potential Impact	Mitigation
Thermal Conditions	Dewatering can create a dry reach with exposure to higher thermal conditions on the pumped floodplain, and the opposite on the floodplain receiving the water. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourse. Hence, given the localised nature of this activity and the much larger area of the water body, the impact of dewatering is expected to be negligible at the WFD water body scale.
Oxygenation Conditions	Dewatering can increase oxygenation on the pumped floodplain and the opposite effect on the receiving floodplain. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourse. Hence, given the localised nature of this activity and the much larger area of the water body, the impact of dewatering is expected to be negligible at the WFD water body scale.
Nutrient Conditions	Dewatering can alter nutrient conditions on the pumped and receiving floodplains. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourse. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of dewatering is expected to be negligible at the WFD water body scale.
Priority Hazardous Substances	Dewatering can increase priority hazardous substances in the floodplain receiving water. Through time, overland erosion can transport those substances to the watercourse. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourse. Additionally, dewatering would be undertaken using portable pumps to take the water from the trenches/excavations and pump it into mobile containerised tanks. The tanks would have weirs to allow suspended solids and sediment to settle. Regular quality testing of the water would take place after it has passed through the weirs to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of dewatering is expected to be negligible at the WFD water body scale.

Table 5.4: Impact on the WFD Quality elements from hydrostatic testing on relevant water bodies

Quality Element	Potential Impact	Mitigation
Relevant water bodies: Dee (N.Wales)		
Surface water and Transitional/Coastal		
Biological		
Macrophytes & Phytoplankton	**Generic Impacts** Hydrostatic testing could impact the physico-chemical and hydromorphological conditions of affected watercourse in case of leakage, which could cause direct damage and/or habitat degradation. This impact would be temporary in nature and limited to the Construction Stage.	**Generic Mitigation** Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourse. Additionally, hydrostatic testing would be undertaken using waters with similar physico-chemical characteristics to the crossed watercourse. Regular quality testing of the water will take place after it has passed through the pipeline to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. In addition, temporary discharges would comply with the requirements for permits on Main Rivers from Natural Resources Wales, both regarding acceptable discharge volumes and water quality (**D-WR-030 of the REAC**).
Invertebrates	**Generic Impacts** Hydrostatic testing could impact the physico-chemical and hydromorphological conditions of affected watercourse in case of leakage, which could cause direct damage to invertebrates and/or habitat degradation. This impact would be temporary in nature and limited to the Construction Stage.	Generic Mitigation Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourse. Additionally, hydrostatic testing would be undertaken using waters with similar physico-chemical characteristics to the crossing watercourse. Regular quality testing of the water will take place after it has passed through the pipeline to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. D-WR-030 of the REAC: Measures include, where practicable, on construction works will avoid works on watercourses during high flow events to reduce the risk of fine sediment release and minimise the increase to flood risk from dewatering / hydrostatic testing discharges. The Detailed Design construction programme will seek to target the construction activities involving watercourses for the drier summer months to reduce this risk, whilst taking into account the window for construction activities in relation to aquatic ecology and, in particular, the fish migratory season.
Fish	**Generic Impacts** Hydrostatic testing could impact the physico-chemical and hydromorphological conditions of affected watercourse in case of leakage, which could cause direct damage to fish and/or habitat degradation. This impact would be temporary in nature and limited to the Construction Stage.	**Generic Mitigation** Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourse. Additionally, hydrostatic testing would be undertaken using waters with similar physico-chemical characteristics to the crossing watercourse. Regular quality testing of the water will take place after it has passed through the pipeline to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied.

Quality Element	Potential Impact	Mitigation
		D-WR-030 of the REAC: measures include, where practicable, on construction works will avoid works on watercourses during high flow events to reduce the risk of fine sediment release and minimise the increase to flood risk from dewatering / hydrostatic testing discharges. The Detailed Design construction programme will seek to target the construction activities involving watercourses for the drier summer months to reduce this risk, whilst taking into account the window for construction activities in relation to aquatic ecology and, in particular, the fish migratory season.
Relevant water bodies: Dee (N.Wales)		
Surface water		
Physico-Chemical		
Thermal Conditions	Hydrostatic testing can alter the thermal conditions on the channel-floodplain in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourse. Hence, given the localised nature of this activity and the much larger area of the water body, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale. **D-WR-030 of the REAC:** measures include, where practicable, on construction works will avoid works on watercourses during high flow events to reduce the risk of fine sediment release and minimise the increase to flood risk from dewatering / hydrostatic testing discharges. The Detailed Design construction programme will seek to target the construction activities involving watercourses for the drier summer months to reduce this risk, whilst taking into account the window for construction activities in relation to aquatic ecology and, in particular, the fish migratory season.
Oxygenation Conditions	Hydrostatic testing can increase oxygenation on the channel-floodplain in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourse. Hence, given the localised nature of this activity and the much larger area of the water body, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale. **D-WR-030 of the REAC:** measures include, where practicable, on construction works will avoid works on watercourses during high flow events to reduce the risk of fine sediment release and minimise the increase to flood risk from dewatering / hydrostatic testing discharges. The Detailed Design construction programme will seek to target the construction activities involving watercourses for the drier summer months to reduce this risk, whilst taking into account the window for construction activities in relation to aquatic ecology and, in particular, the fish migratory season.
Salinity	Hydrostatic testing can alter salt levels on the channel-floodplain in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourse. Additionally, hydrostatic testing would be undertaken using waters with similar physico-chemical characteristics to the crossing watercourse. Regular quality testing of the water will take place after it has passed through the pipeline to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC** measures include, where practicable, on construction works will avoid works on watercourses during high flow events to reduce the risk of fine sediment release and minimise the increase to flood risk from dewatering / hydrostatic testing discharges. The Detailed Design construction programme will seek to target the construction activities involving watercourses for the drier summer months to reduce this risk, whilst taking into account the window for construction activities in relation to aquatic ecology and, in particular, the fish migratory season.
Acidification Status	Hydrostatic testing can alter the pH on the channel-floodplain in case of leakage. This impact	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourse. Additionally, hydrostatic testing would be undertaken using waters with similar physico-chemical characteristics to the

Quality Element	Potential Impact	Mitigation
	would be temporary in nature and limited to the Construction Stage.	crossing watercourse. Regular quality testing of the water will take place after it has passed through the Proposed Development to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC** measures include, where practicable, on construction works will avoid works on watercourses during high flow events to reduce the risk of fine sediment release and minimise the increase to flood risk from dewatering / hydrostatic testing discharges. The Detailed Design construction programme will seek to target the construction activities involving watercourses for the drier summer months to reduce this risk, whilst taking into account the window for construction activities in relation to aquatic ecology and, in particular, the fish migratory season.
Nutrient Conditions	Hydrostatic testing can alter existing nutrient conditions on the channel-floodplain in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourse Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC** measures include, where practicable, on construction works will avoid works on watercourses during high flow events to reduce the risk of fine sediment release and minimise the increase to flood risk from dewatering / hydrostatic testing discharges. The Detailed Design construction programme will seek to target the construction activities involving watercourses for the drier summer months to reduce this risk, whilst taking into account the window for construction activities in relation to aquatic ecology and, in particular, the fish migratory season.
Priority Hazardous Substances	Hydrostatic testing can release priority hazardous substances on the channel-floodplain in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourse. Additionally, hydrostatic testing would be undertaken using waters with similar physico-chemical characteristics to the crossing watercourse. Regular quality testing of the water will take place after it has passed through the Proposed Development to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC** measures include, where practicable, on construction works will avoid works on watercourses during high flow events to reduce the risk of fine sediment release and minimise the increase to flood risk from dewatering / hydrostatic testing discharges. The Detailed Design construction programme will seek to target the construction activities involving watercourses for the drier summer months to reduce this risk, whilst taking into account the window for construction activities in relation to aquatic ecology and, in particular, the fish migratory season.
Hydromorphological		
Quantity and Dynamics of Water Flow	Hydrostatic testing can alter the base flow and hydraulic connectivity with the open channel flow in case of leakage which could impact the quantity and dynamics of water flow. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourse. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC** measures include, where practicable, on construction works will avoid works on watercourses during high flow events to reduce the risk of fine sediment release and minimise the increase to flood risk from dewatering / hydrostatic testing discharges. The Detailed Design construction programme will seek to target the construction activities involving

Quality Element	Potential Impact	Mitigation
		watercourses for the drier summer months to reduce this risk, whilst taking into account the window for construction activities in relation to aquatic ecology and, in particular, the fish migratory season.
River Depth and Width Variation	Hydrostatic testing can alter the base flow and hydraulic connectivity with the open channel flow, potentially resulting in river depth and width variation in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourse. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC** measures include, where practicable, on construction works will avoid works on watercourses during high flow events to reduce the risk of fine sediment release and minimise the increase to flood risk from dewatering / hydrostatic testing discharges. The Detailed Design construction programme will seek to target the construction activities involving watercourses for the drier summer months to reduce this risk, whilst taking into account the window for construction activities in relation to aquatic ecology and, in particular, the fish migratory season.
Structure and Substrate of the River Bed	Hydrostatic testing can alter the base flow and hydraulic connectivity with the open channel flow, potentially resulting in changes in discharge and in the riverbed characteristics in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourse. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC** measures include, where practicable, on construction works will avoid works on watercourses during high flow events to reduce the risk of fine sediment release and minimise the increase to flood risk from dewatering / hydrostatic testing discharges. The Detailed Design construction programme will seek to target the construction activities involving watercourses for the drier summer months to reduce this risk, whilst taking into account the window for construction activities in relation to aquatic ecology and, in particular, the fish migratory season.
Transitional		
Physico-Chemical		
Transparency	Hydrostatic testing can transfer suspended solids from the added water to the receiving channel-floodplain in case of leakage. Therefore, there is a potential to impact the watercourse transparency via overland erosion on the floodplain and direct release of suspended solid into the channel. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourse. Additionally, hydrostatic testing would be undertaken using waters with similar physico-chemical characteristics to the crossing watercourse. Regular quality testing of the water would take place after it has passed through the Proposed Development to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC** measures include, where practicable, on construction works will avoid works on watercourses during high flow events to reduce the risk of fine sediment release and minimise the increase to flood risk from dewatering / hydrostatic testing discharges. The Detailed Design construction programme will seek to target the construction activities involving watercourses for the drier summer months to reduce this risk, whilst taking into account the window for construction activities in relation to aquatic ecology and, in particular, the fish migratory season.
Oxygenation Conditions	Hydrostatic testing can increase oxygenation on the channel-floodplain in case of leakage. This	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourse. Hence, given the localised nature of this activity and the much larger area of the water body, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale.

Quality Element	Potential Impact	Mitigation
	impact would be temporary in nature and limited to the Construction Stage.	**D-WR-030 of the REAC** measures include, where practicable, on construction works will avoid works on watercourses during high flow events to reduce the risk of fine sediment release and minimise the increase to flood risk from dewatering / hydrostatic testing discharges. The Detailed Design construction programme will seek to target the construction activities involving watercourses for the drier summer months to reduce this risk, whilst taking into account the window for construction activities in relation to aquatic ecology and, in particular, the fish migratory season.
Nutrient Conditions	Hydrostatic testing can alter existing nutrient conditions on the channel-floodplain in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourse Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC** measures include, where practicable, on construction works will avoid works on watercourses during high flow events to reduce the risk of fine sediment release and minimise the increase to flood risk from dewatering / hydrostatic testing discharges. The Detailed Design construction programme will seek to target the construction activities involving watercourses for the drier summer months to reduce this risk, whilst taking into account the window for construction activities in relation to aquatic ecology and, in particular, the fish migratory season.
Priority Hazardous Substances	Hydrostatic testing can release priority hazardous substances on the channel-floodplain in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourse. Additionally, hydrostatic testing would be undertaken using waters with similar physico-chemical characteristics to the crossing watercourse. Regular quality testing of the water will take place after it has passed through the Proposed Development to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC** measures include, where practicable, on construction works will avoid works on watercourses during high flow events to reduce the risk of fine sediment release and minimise the increase to flood risk from dewatering / hydrostatic testing discharges. The Detailed Design construction programme will seek to target the construction activities involving watercourses for the drier summer months to reduce this risk, whilst taking into account the window for construction activities in relation to aquatic ecology and, in particular, the fish migratory season.

Table 5.5: Impact on the WFD Quality elements from new drainage and outfalls on relevant water bodies

Quality Element	Potential Impact	Mitigation
Relevant water bodies: Dee (N. Wales)		
Surface water and transitional/coastal		
Biological		
Invertebrates	Drainages and outfalls can alter the physico-chemical and hydromorphological conditions of the water body, which can negatively impact invertebrate quality elements. Potential impacts could occur during the construction and Operational Stage.	Potential impacts to invertebrates through deterioration of the physico-chemical condition would be mitigated through treatment measures. These measures are filter drain, vortex separator, and attenuation ponds. In conjunction, these treatments ensure that any pluvial water returning to a watercourse would achieve good standards of quality through removal of any physical and chemical disturbance, hence minimising any detrimental impact on WFD quality elements. Potential impacts to invertebrates through deterioration of the hydromorphological condition would be mitigated through two embedded mitigation measures. These measures are setting back the outfall and regulating the returning flow. By setting back the outfall, there would be an open channel connecting the pluvial and fluvial waters, ensuring that no permanent structure is installed within the river corridor. Outfall flow would be restricted to 2l/s, which is as close to greenfield rates as practicable. Therefore, by applying these mitigation measures, no significant impact on the invertebrate conditions is expected from the required drainages and outfalls either local or at the water body scale.
Fish	Drainages and outfalls can alter the physico-chemical and hydromorphological conditions of the water body, which can negatively impact fish quality elements. Potential impacts could occur during the construction and Operational Stage.	Potential impacts to fish through deterioration of the physico-chemical condition would be mitigated through treatment measures. These measures are filter drain, vortex separator, and attenuation ponds. In conjunction, these treatments ensure that any pluvial water returning to a watercourse would achieve good standards of quality through removal of any physical and chemical disturbance, hence minimising any detrimental impact on WFD quality elements. Potential impacts to fish through deterioration of the hydromorphological condition would be mitigated through two embedded mitigation measures. These measures are setting back the outfall and regulating the returning flow. By setting back the outfall, there would be an open channel connecting the pluvial and fluvial waters, ensuring that no permanent structure is installed within the river corridor. Outfall flow would be restricted to 2l/s, which is as close to greenfield rates as practicable. Therefore, by applying these mitigation measures, no significant impact on the fish population is expected from the required drainages and outfalls either local or at the water body scale.

Quality Element	Potential Impact	Mitigation
Surface water		
Physico-Chemical		
Thermal Conditions	Drainages and outfalls can release suspended solids and dissolved chemical load. Therefore, potentially altering the existing thermal conditions. Potential impacts could occur during the construction and Operational Stage.	Potential impacts to thermal condition would be mitigated through treatment measures. These measures are filter drain, vortex separator, and attenuation ponds. In conjunction, these treatments ensure that any pluvial water returning to a watercourse would achieve good standards of quality through removal of any physical and chemical disturbance, hence minimising any detrimental impact on WFD quality elements. Therefore, by applying those treatment measures, no significant impact on thermal conditions is expected from the required drainages and outfalls either local or at the water body scale.
Oxygenation Conditions	Drainages and outfalls can release suspended solids and dissolved chemicals to the water body. Therefore, potentially altering the existing oxygenation conditions. Potential impacts could occur during the construction and Operational Stage.	Potential impacts to oxygenation condition would be mitigated through treatment measures. These measures are filter drain, vortex separator, and attenuation ponds. In conjunction, these treatments ensure that any pluvial water returning to a watercourse would achieve good standards of quality through removal of any physical and chemical disturbance, hence minimising any detrimental impact on WFD quality elements. Therefore, by applying those treatment measures, no significant impact on oxygenation conditions is expected from the required drainages and outfalls either local or at the water body scale.
Acidification Status	Drainages and outfalls can release suspended solids and dissolved chemical to the water body. Therefore, potentially altering the existing pH status. Potential impacts could occur during the construction and Operational Stage.	Potential impacts to acidification status would be mitigated through treatment measures. These measures are filter drain, vortex separator, and attenuation ponds. In conjunction, these treatments ensure that any pluvial water returning to a watercourse would achieve good standards of quality through removal of any physical and chemical disturbance, hence minimising any detrimental impact on WFD quality elements. Therefore, by applying those treatment measures, no significant impact on acidification status is expected from the required drainages and outfalls either local or at the water body scale.
Nutrient Conditions	Drainages and outfalls can release suspended solids and dissolved chemical to the water body. Therefore, potentially altering the existing nutrient conditions. Potential impacts could occur during the construction and Operational Stage.	Potential impacts to nutrient conditions would be mitigated through treatment measures. These measures are filter drain, vortex separator, and attenuation ponds. In conjunction, these treatments ensure that any pluvial water returning to a watercourse would achieve good standards of quality through removal of any physical and chemical disturbance, hence minimising any detrimental impact on WFD quality elements. Therefore, by applying those treatment measures, no significant impact on acidification status is expected from the required drainages and outfalls either local or at the water body scale.
Priority Hazardous Substances	Drainages and outfalls can release suspended solids and dissolved chemical to the water body. Therefore, potentially altering the existing priority hazardous substances levels. Potential impacts could occur during the construction and Operational Stage.	Potential impacts to existing priority hazardous substances levels would be mitigated through treatment measures. These measures are filter drain, vortex separator, and attenuation ponds. In conjunction, these treatments ensure that any pluvial water returning to a watercourse would achieve good standards of quality through removal of any physical and chemical disturbance, hence minimising any detrimental impact on WFD quality elements. Therefore, by applying those treatment measures, no significant impact on existing priority hazardous substances levels is expected from the required drainages and outfalls either local or at the water body scale.

Quality Element	Potential Impact	Mitigation
Hydromorphological		
Quantity and Dynamics of Water Flow	Drainages and outfalls can directly rearrange the natural quantity and dynamics of water flow. Potential impacts could occur during the construction and Operational Stage.	Two embedded mitigation measures have been designed to the new drainage and outfalls to reduce impacts on the natural quantity and dynamics of water flow. These measures are setting back the outfall and regulating the returning flow. By setting back the outfall, there would be an open channel connecting the pluvial and fluvial waters, ensuring that no permanent structure is installed within the river corridor. Outfall flow would be restricted to 2l/s, which is as close to greenfield rates as practicable. Together, these mitigation measures are expected to eliminate any detrimental impact to the natural quantity and dynamics of water flow within the water body.
River Continuity	Drainages and outfalls can directly rearrange the natural river continuity. Potential impacts could occur during the construction and Operational Stage.	Two embedded mitigation measures have been designed to the new drainage and outfalls to reduce impacts on the natural river continuity. These measures are setting back the outfall and regulating the returning flow. By setting back the outfall, there would be an open channel connecting the pluvial and fluvial waters, ensuring that no permanent structure is installed within the river corridor. Outfall flow would be restricted to 2l/s, which is as close to greenfield rates as practicable. Together, these mitigation measures are expected to eliminate any detrimental impact to the natural river continuity within the water body.
River Depth and Width Variation	Drainages and outfalls can directly rearrange the natural river depth and width variation. Potential impacts could occur during the construction and Operational Stage.	Two embedded mitigation measures have been designed to the new drainage and outfalls to reduce impacts on the natural river depth and width variation. These measures are setting back the outfall and regulating the returning flow. By setting back the outfall, there would be an open channel connecting the pluvial and fluvial waters, ensuring that no permanent structure is installed within the river corridor. Outfall flow would be restricted to 2l/s, which is as close to greenfield rates as practicable. Together, these mitigation measures are expected to eliminate any detrimental impact to the natural river depth and width variation within the water body.
Structure and Substrate of the River Bed	Drainages and outfalls can directly rearrange the natural structure and substrate of the river bed. Potential impacts could occur during the construction and Operational Stage.	Two embedded mitigation measures have been designed to the new drainage and outfalls to reduce impacts on the natural structure and substrate of the river bed. These measures are setting back the outfall and regulating the returning flow. By setting back the outfall, there would be an open channel connecting the pluvial and fluvial waters, ensuring that no permanent structure is installed within the river corridor. Outfall flow would be restricted to 2l/s, which is as close to greenfield rates as practicable. Together, these mitigation measures are expected to eliminate any detrimental impact to the natural structure and substrate of the river bed within the water body.
Structure of the Riparian Zone	Drainages and outfalls can directly alter the existing infiltration rate and lateral connectivity of the riparian zone. Potential impacts could occur during the construction and Operational Stage.	Two embedded mitigation measures have been designed to the new drainage and outfalls to reduce impacts on the riparian zone. These measures are setting back the outfall and regulating the returning flow. By setting back the outfall, there would be an open channel connecting the pluvial and fluvial waters, ensuring that no permanent structure is installed within the river corridor, and, hence, no changes to lateral connectivity (e.g., flood flows or greater). Outfall flow would be restricted to 2l/s, which is as close to greenfield rates as practicable, hence, favouring infiltration along the riparian zone. Together, these mitigation measures are expected to eliminate any detrimental impact to the natural structure of the riparian zone.
Transitional		
Physico-Chemical		
Transparency	Drainages and outfalls required in the temporary construction sites and accesses roads can release suspended solids and dissolved chemical to the	Appropriate drainage systems would be incorporated in temporary construction areas and access roads where necessary to deposit any run-off into designated areas for general infiltration. The Temporary Construction Compounds are proposed typically to be surfaced via suitable crushed aggregate sub-base which would allow surface water to be managed through local infiltration.

Quality Element	Potential Impact	Mitigation
	water body. Therefore, potentially altering the existing transparency levels of the water body. Potential impacts could occur during the construction and Operational Stage.	Therefore, no significant impact on transparency levels is expected at the water body scale from the required drainages and outfalls.
Thermal Conditions	Drainages and outfalls required in the temporary construction sites and accesses roads can release suspended solids and dissolved chemical to the water body. Therefore, potentially altering the existing thermal conditions of the water body. Potential impacts could occur during the construction and Operational Stage.	Appropriate drainage systems would be incorporated in temporary construction areas and access roads where necessary to deposit any run-off into designated areas for general infiltration. The Temporary Construction Compounds are proposed typically to be surfaced via suitable crushed aggregate sub-base which would allow surface water to be managed through local infiltration. Therefore, no significant impact on transparency levels is expected at the water body scale from the required drainages and outfalls.
Priority Hazardous Substances	Drainages and outfalls required in the temporary construction sites and accesses roads can release suspended solids and dissolved chemical to the water body. Therefore, potentially altering the existing priority hazardous substances levels of the water body. Potential impacts could occur during the construction and Operational Stage.	Appropriate drainage systems would be incorporated in temporary construction areas and access roads where necessary to deposit any run-off into designated areas for general infiltration. The Temporary Construction Compounds are proposed typically to be surfaced via suitable crushed aggregate sub-base which would allow surface water to be managed through local infiltration. Therefore, no significant impact on transparency levels is expected at the water body scale from the required drainages and outfalls.

5.3. STEP 3: REVIEW OF MITIGATION MEASURES TO DELIVER WFD OBJECTIVES

5.3.1. The high level WFD Mitigation Measures set out in the 2021 draft RBMP and 2015 official RBMP that are relevant to the Proposed Development are considered for the Dee (North Wales) Transitional water body (**Table 5.12**),. Mitigation measures set for individual Dee (North Wales) WFD water body are reviewed in **Table 5-17**

Table 5.6: Mitigation measures available in the Dee (N. Wales) 2021 draft RBMP and their relation to the Proposed Development

Category	Mitigation measure	Justification
Navigation	49.Modify vessel design	No changes proposed to navigable channels.
Navigation	50.Vessel Management	No changes proposed to navigable channels.
Operations and maintenance	21.Avoid the need to dredge	No dredging proposed. No works in water body to impact any current dredging works.
Operations and maintenance	22.Dredging disposal strategy	No dredging proposed. No works in water body to impact any current dredging works.
Operations and maintenance	23.Reduce impact of dredging	No dredging proposed. No works in water body to impact any current dredging works.
Operations and maintenance	24.Reduce sediment resuspension	The crossings are unlikely to cause long-term sediment resuspension. The scale of the works is negligible compared to the size of the water body.
Operations and maintenance	25.Retime dredging or disposal	No dredging proposed. No works in water body to impact any current dredging works.
Operations and maintenance	26.Sediment management	The scale of the works is negligible compared to the size of the water body, and it would not impact existing or future sediment management operations.
Operations and maintenance	27. Dredge disposal site selection	No dredging proposed. No works in water body to impact any current dredging works.
Operations and maintenance	28.Manage disturbance	No dredging proposed. No works in water body to impact any current dredging works.
Structural modification	14.Modify structure	No structural modification proposed. No works in water body to impact any current modification works.
Structural modification	15.Flow manipulation	No structural modification proposed. No works in water body to impact any current flow.
Working with physical form and function	1.Modify channel	No changes proposed to physical form and function. In addition, the installation of cabling will be buried to a suitable depth so as not to

Category	Mitigation measure	Justification
		impede future lateral and vertical channel adjustment of those watercourse crossed by the Proposed Development.
Working with physical form and function	2.Remove obsolete structure	No changes proposed to physical form and function. In addition, the installation of cabling will be buried to a suitable depth so as not to impede future lateral and vertical channel adjustment of those watercourse crossed by the Proposed Development.

Table 5.7: Mitigation measures in place in the Dee (N. Wales) transitional water body

Category	Measure	Justification
Navigation	Modify vessel design	The Proposed Development will be buried at least 8m below the bed of the Dee. This will not affect navigation.
Navigation	Vessel management	
Operations and Maintenance	Avoid the need to dredge	The Proposed Development will be buried at least 8m below the bed of the Dee. This will not affect sediment management and dredging.
Operations and Maintenance	Dredging disposal strategy	
Operations and Maintenance	Reduce impact of dredging	
Operations and Maintenance	Reduce sediment resuspension	The Proposed Development will be buried at least 8m below the bed of the Dee. This will not affect sediment management and dredging. The Proposed Development will be laid via trenchless methods and will not disturb in-channel sediment.
Operations and Maintenance	Retime dredging or disposal	The Proposed Development will be buried at least 8m below the bed of the Dee. This will not affect sediment management and dredging.
Operations and Maintenance	Sediment management	
Operations and Maintenance	Dredge disposal site selection	
Operations and Maintenance	Manage disturbance	The Proposed Development will be buried at least 8m below the bed of the Dee. This will not affect sediment management and dredging. The Proposed Development will be laid via

Category	Measure	Justification
		trenchless methods and will not disturb in-channel sediment.
Structural Modification	Modify structure	The Proposed Development will be buried at least 8m below the bed of the Dee. There will be no change to structures within the Dee and the Proposed Development will not prevent the modification of structures in the future.
Structural Modification	Flow manipulation	The Proposed Development will be buried at least 8m below the bed of the Dee. There will be no change to flow control within the Dee and the Proposed Development will not prevent the modification of flow controls in the future.
Working with Physical Form and Function	Modify channel	The Proposed Development will be buried at least 8m below the bed of the Dee. The pipe will be laid using trenchless methods and so the channel would not be modified.
Working with Physical Form and Function	Removal obsolete structures	The Proposed Development will be buried at least 8m below the bed of the Dee. There will be no change to structures within the Dee and the Proposed Development will not prevent the removal of structures in the future.

5.4. STEP 4: ASSESSMENT OF THE PROPOSED DEVELOPMENT AGAINST WFD OBJECTIVES

5.4.1. The compliance of the Proposed Development is determined based on an assessment against the following objectives discussed below considering biological, physico-chemical, and hydromorphological quality elements for each water body assessed.

DOES THE PROPOSED DEVELOPMENT CAUSE DETERIORATION IN THE ECOLOGICAL POTENTIAL OR STATUS OF A BODY OF SURFACE OR GROUNDWATER?

Groundwater WFD water bodies

5.4.2. Groundwater was scoped out of the detailed assessment due to no impacts being anticipated at the water body scale. A WFD assessment summary is however provided below for completeness for the following groundwater WFD

water bodies: Dee Permo-Triassic Sandstone (GB41101G202400); and Dee Carboniferous Coal Measures (GB1102G204800).

Quantitative

5.4.3. No deterioration is expected in the current and potential status of the quantitative elements if the mitigation outlined in the CEMP and Groundwater Measurement and Monitoring Plan (GWMMP) are implemented.

Qualitative

5.4.4. No deterioration is expected in the current and potential status of the qualitative elements if the mitigation outlined in the CEMP and GWMMP are implemented.

DOES THE PROPOSED DEVELOPMENT COMPROMISE THE ABILITY OF THE WATER BODY TO ACHIEVE GOOD ECOLOGICAL STATUS OR POTENTIAL?

5.4.5. Impacts would be predominantly limited to the Construction Stage of the Proposed Development and therefore temporary in nature. Habitats would be reinstated as far as practicable to replicate baseline conditions. Habitats are expected to naturally recover within two years following reinstatement and therefore no long-term impact anticipated.

5.4.6. Where tree removal is required along the watercourse in the riparian zone for both enabling and construction works, trees would be replaced in accordance with the scheme wide tree planting strategy. This vegetation will be a mix of riparian species and trees where practicable (**D-BD-048 and D-WR-063** of the **REAC**), respectively measures will include:

- Channel and banks will be reinstated to mimic baseline conditions as far as practicable to ensure more natural bank forms and in-channel features and morphological diversity. This includes reinstatement of an appropriate vegetation assemblage and structure within the riparian zone along with enhancements to the riparian zone to off-set impacts. Any tree loss would be compensated for in accordance with the site wide replanting strategy.

Groundwater WFD water bodies

5.4.7. Given that no long-lasting disturbance is expected, the Proposed Development would not compromise the ability of the water bodies potentially impacted to achieve Good Ecological Potential/Status.

DOES THE PROPOSED DEVELOPMENT CONTRIBUTE TO THE DELIVERY OF THE WFD OBJECTIVES (E.G., MITIGATION MEASURES)?

5.4.8. The Proposed Development does not contribute directly to the WFD objectives, but it is environmentally significant to reduce carbon emissions in the UK.

5.4.9. Consideration of WFD mitigation Measures has been given in the design process so as not to prevent the achievement of those measures.

5.5. STEP 5: ASSESSMENT OF THE PROPOSED DEVELOPMENT AGAINST OTHER EU LEGISLATION

5.5.1. Article 4.9 of the WFD requires that "*Member States shall ensure that the application of the new provisions guarantees at least the same level of protection as the existing Community legislation*".

5.5.2. The Nitrates Directive is relevant to the assessment of new modifications. Any potential change in the nutrient dynamics due to the Proposed Development is most likely due to changes in the sediment regime. No sources of nitrates would be introduced to the water body as part of the Proposed Development. Therefore, no separate assessment is required for nitrates.

5.5.3. The Freshwater Fish Directive was originally adopted in 1978 and was consolidated in 2006, then repealed in 2013. Therefore, no separate assessment is required for fish and the Proposed Development would be designed to mitigate impacts on fish.

6. CONSTRUCTION IMPACTS

6.1. POTENTIAL CONSTRUCTION IMPACTS

6.1.1. The construction period is expected to be up to four weeks working for both micro-tunnelling and for HDD, which has the potential for short- to medium-term effects on the water environment. Therefore, it is important to consider potential construction impacts on the WFD quality elements, WFD mitigation measures and actions, and the overall WFD status. Further assessment may also be required at the Detailed Design stage.

6.1.2. Effective mitigation should be put in place to eliminate or reduce any potential construction impacts to the receiving water body. Construction impacts are, however, unlikely to have long-reaching effects extending to other upstream and downstream water bodies, which would need to be considered within the assessment to reduce the risk of impacts to WFD receptors.

6.1.3. Trenchless crossing construction activities are unlikely to have an adverse impact on fluvial geomorphological processes, that would consequently have knock-on effects to the hydromorphology, biological, and physico-chemical quality elements.

6.1.4. Potential Environmental Risks are therefore limited to potential alterations to WFD quality elements from hydrostatic testing activities, and include:

- Changes to quantity and dynamics of flow;
- Fuel and oil spillage resulting in contamination of watercourse; and
- Contamination of watercourse with physico-chemical discharges.

6.1.5. The release of potentially toxic compounds such as fuel, oils and chemicals could have a significant impact in the vicinity and downstream of the construction site. Measures need to be in place to prevent the accidental release of pollutants into the watercourse.

6.2. CONSTRUCTION MITIGATION

6.2.1. The objectives of the mitigation measures included in the **OCEMP** for the Proposed Development and the **REAC** are to avoid/prevent, reduce, or offset these construction impacts.

7. CONCLUSION

7.1.1. The majority of the potential impacts arising from the Proposed Development on the River Dee watercourse would be during the Construction Stage. Consequently, those impacts would primarily be temporary and with only localised impacts.

7.1.2. Design and construction methods have been adopted where practicable to eliminate, reduce, and mitigate potential impacts as far as practicable.

7.1.3. The Proposed Development would not prevent the achievement of WFD mitigation measures set for the Dee (N. Wales) Transitional water body, and Dee River Basin Management Plan.

7.1.4. The Proposed Development has been assessed to have no impact on the Dee Permo-Triassic Sandstone and the Dee Carboniferous Coal Measures WFD water bodies.

7.1.5. Construction impacts would be mitigated through best-practice measures. A CEMP will be produced and implemented throughout the Proposed Development and during all construction activities. The CEMP will be produced by the Construction Contractor prior to the commencement of construction and will specify measures to avoid/control impacts on the natural environment. The CEMP will be informed by the measures detailed within the **OCEMP** and **REAC** that accompany the Marine Licence application.

7.1.6. As WFD overall status is contingent on the status of associated protected areas, namely the River Dee and Bala Lake /Afon Dyfrdwy A Llyn Tegid SAC, the final conclusion on overall status for the Proposed Development is dependent on the outcome of the Habitats Regulations Assessment (HRA). The HRA has concluded that following the implementation of the measures detailed within the **OCEMP** and **REAC**, the Proposed Development would not adversely affect the integrity of the European Sites, either alone, or in-combination.

7.1.7. Therefore, it is concluded that, with the proposed mitigation in place, the WFD assessment has demonstrated that the Proposed Development will not compromise the objectives of WFD and will not have a negative impact on the ability of the WFD waterbody to achieve compliance.

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Annex A

MEETING NOTES

ANNEX A - MEETING NOTES

AGENDA & MEETING NOTES 1

PROJECT NUMBER	70070865	**MEETING DATE**	02 March 2022
PROJECT NAME	HyNet North West Carbon Dioxide Pipeline - DCO	**VENUE**	Teams
CLIENT	Progressive Energy	**RECORDED BY**	GK
MEETING SUBJECT	WFD and FRA – EA Consultation		

PRESENT	Frances Marlow (FM) (WSP), Georgie Kleinschmidt (WSP), Helen Parsons (WSP), Gabriel Solis (WSP), Vic Mohun (WSP), Luke Mitchell (WSP), Trevor Croft (PEL), Stephen Sayce (EA), Graham Todd (EA), Duncan Revell (EA)
APOLOGIES	Apologies
DISTRIBUTION	As above plus:
CONFIDENTIALITY	**Restricted**

ITEM	SUBJECT	ACTION	DUE
	Introductions		
	Agenda		
	GK provided summary of the Project and DCO		
	Stephen: Currently reviewing the PEIR. EA required to provide statutory response. Will charge for information beyond initial consultation as part of the PEIR. Will fall outside the statutory process. FM: Screening and scoping of WFD elements has not been included within the PEIR		

ITEM	SUBJECT	ACTION	DUE
	FM: Provided list of Main Rivers and WFD water bodies and WFD Groundwater bodies in the vicinity of the Order Limits. See slides attached to these minutes.		
	FM: Presented the screening of water bodies (see attached slides). FM: Explained works to smaller watercourses within the wider WFD water body will be assessed. Tributaries of the Mersey transitional waterbody will be assessed using surface water quality elements and summarised within the transitional water body section of the assessment. DR agreed with this approach. DR: Generally, agree with the screening conclusion. Main Rivers don't match with WFD water bodies. Stanney Main Drain also need to be assessed. FM: All Main Rivers and relevant ordinary watercourses will be assessed within each WFD catchment SS to confirm is Garden City Drain is in Wales or England. FM explained that the tributary of Garden City Drain, which is crossed by a trenched crossing, is located in England. FM: Groundwater team unable to conclude on screening whether groundwater bodies should be included. May be requesting further meeting about whether they should be screened in. DR and SS: Need to speak to EA groundwater team before providing comment. FM: Propose to do one WFD assessment for whole scheme, including England and Wales HP: Are EA happy with the approach to undertake one WFD assessment and send to both NRW and EA? DR: Yes happy with this approach	SS SS/DR	
	FM: Outlined activities involved in the DCO (See information on attached slides) FM: Still awaiting final design freeze information which may provide more detail about the temporary crossings.		

ITEM	SUBJECT	ACTION	DUE
	FM: Presented the screening exercise for the proposed activities. (See attached slides) HP: Asked for mitigation measures for all watercourses. Specifically asked for those proposed on the River Gowy and whether there are any plans to re-naturalise the floodplain and set the embankment further back. DR: Will send the mitigation measures for all relevant water bodies. There are plans on the Gowy to move the left bank embankment further back from the channel. The DCO Proposed Development would need to make sure it did not prevent this from occurring. DR to confirm plans for the Gowy. DR: Asked what the temporary crossings would be. FM: Unsure what the crossing type will be yet. Expecting Bailey Bridge for larger watercourses and culverts for smaller watercourses. SS: Only concern on the screening is excluding River Continuity for temporary watercourse crossings. Could be seeking to hold flow, so need to consider this too. Depends on final design. The EA also retains the no culvert policy but understands that temporary ones may be required for construction. Where possible, temporary crossings that span the watercourse without affecting the channel should be used. If culverts are required for temporary crossings, an assessment of effects would be needed. GT stated that modelling of temporary effects of culverts would not be required but the structures would need to be of appropriate capacity. A design process and optioneering would need to be presented along with justification for using culverts and not just due to cost. FM: Screening conclusion will be included in minutes as slide pack and EA can formally responded to scoping opinion. DR: Ince marshes drain towards the Ince pumping station operated by the EA. This pumps water into the Manchester Ship Canal. Therefore, this may need to be screened in for assessment, but water quality elements only (not morphological or biological).	DR DR FM	

ITEM	SUBJECT	ACTION	DUE
	DR: Necessary to consider screens on pumps for temporary diversions so that fish are not in danger. Size of screen will depend on species in the watercourse. There may be eels in the River Gowy. Small mesh size would therefore be required if eels are present and screens will then need monitoring for debris and its effect on efficiency throughout construction.		
	HP: Regarding biodiversity calculations and river condition, do the EA consider the reinstatement of the watercourse after the pipeline is laid as reinstatement, despite the bed having been disturbed? DR: If the pipe is laid and the bed is returned to as it was with no bed reinforcement then this is considered as reinstatement. TC: Pipeline to be 2m minimum below bed level for trenchless crossings. Part of current FEED activity. Design standards are deeper than 2m.		
	FM: Presented the proposed methodology for the WFD assessment (see attached slides). SS: Sediment sampling may be needed for land contamination risks FM: This will be picked up by the land contamination team but is not proposed for WFD.		
	FM: Presented the proposed approach to mitigation (see attached slides). DR: Why is the project not aiming for Biodiversity Net Gain(BNG)? TC: BNG is still under consideration, however no net loss is the minimum position currently HP: Is providing WFD mitigation to neutralise impacts acceptable or does the EA expect us to provide any improvements? DR: Ensure no deterioration to water bodies and that mitigation measures aren't impacted. The government announced that projects like this would be considered for providing BNG.	HP	

ITEM	SUBJECT	ACTION	DUE
	HP: Design team will need to know the mitigation measures proposed in the area as this may affect the pipeline depths. HP to inform wider project team of implications to design.		
	FM: Provided an overview of the flood risk areas near the DCO Proposed Development (see attached slides). Ince AGI is in the tidal floodplain according to the Mersey Tidal model received from the EA. Area is also benefitting from flood defences. Stanlow AGIs shown on map at partly flood zone 3. Model for Stanlow Refinery (based on River Gowy model) shows that it is not actually within FZ2 outline. Central compound has been located outside the floodplain at the River Gowy. Temporary compounds will be for the unguided auger boring works. VM: Which model should we rely on for Stanlow AGI, given the EA website and the previous FRA report on the Stanlow AGI show different levels of flood risk? GT: Unsure of details around this. Needs to be examined in FRA. Usually latest and up to date info best to go with, but there may be a caveat surrounding why the model hasn't been published yet. Just need to make sure that it's been done correctly. WSP to request the latest Gale Brook model from the EA. VM: Lots of modelling info requests put to EA, have been sent some files but can't work with a lot of them. Request some more refined data requests for those which we can't open/haven't received. Should this be redirected within the EA? SS: Send to normal address but cc SS in.	VM/GS VM/GS	
	VM: What is the expectation for presentation or format of FRA given linear nature of scheme, i.e., would it be suitable to assess all the trenchless crossing within a similar section and the AGIs and BVs separately? GT: as long as all covered, format less important. VM: Propose to capture main pipeline in one section, as impacts likely to be the same. The AGIs and BVS will be assessed individually in the same FRA.		

ITEM	SUBJECT	ACTION	DUE
	GT: Is a FCA being completed for Wales? Vic: Separate FCA is being completed for the Welsh leg of the DCO application. Currently undertaking separate consultation with NRW. GT: Ensure whatever format adopted complies with each separate country's legislation.		
	VM: Drainage design and strategy prepared by another consultant, would normally include in same report. Would it be sufficient to make reference to a separate document by the other designer? SS: This would appear reasonable, but also need to consult with the LLFA for their individual requirements. EA's principal interest is fluvial flood maps and tidal. SS: Areas known as having groundwater table – could be creating pathway, need to ensure that the design does not create pathways for flooding. VM: Anti-buoyancy measures will be included in the report. The detail design will need to ensure that groundwater information along the pipeline is taken into consideration to prevent groundwater flooding.		
	VM: Regarding flood risk activity permits (FRAPs), are the EA expecting one application for each watercourse or one application covering them all? GT: programming and sequencing needs to be considered. Think about how to progress it. EA don't have a preference. If there are elements which aren't going to change but want the certainty up front, could apply for those. Hold back on applications for less certain elements to avoid abortive work.		
	VM: Is it acceptable to submit an FRA limited to permanent works not temporary measures? GT: Make reference to temporary works, but detail of methodology is better covered off as part of FRAPs, due to later engagement with contractors. Planning and pre-planning doesn't necessarily need the temporary works.		

ITEM	SUBJECT	ACTION	DUE
	VM: Don't want to prescribe the temporary process without engaging with the contractor. SS: Will still need to make reference to construction impacts. VM: Construction impacts will still be included in ES chapter which the FRA will make reference to.		
	VM: The design life of AGIs and BVs is 25 years so what is the correct approach for climate change allowances? GT: Won't be much modelling done since last July when the climate change allowances updated. Existing models might encompass 25-year climate allowance. If not, might need some adaptation in modelling, e.g., manipulation of a stage/discharge graph. SS: Operational life might exceed that, so worth considering extension for safeguarding the design and ensuring future resilience.		
	VM: What would the flood risk vulnerability category for the scheme be? SS: Vulnerability of pipeline to be water compatible but if AGIs need hazardous substance consent it would be highly vulnerable.		
	FM: When applying for FRAP for temporary crossings, what will the EA need to see? GT: If there is a clear span structure, then everything is beyond limits of channel. The EA retain a no culverting policy in the construction phase. Want to ensure short term impacts are as minimal as possible. No dig methods may not necessarily require FRAPs and the guidance regarding this needs to be consulted by the designer/applicant FM: Does the EA expect hydraulic modelling of temporary pipes? GT: No, but would consult Duncan's team (WFD/biodiversity) as well. EA would want to ensure that the capacity of any structure is commensurate with the watercourse. The EA would want assurance that the capacity is correct. An		

ITEM	SUBJECT	ACTION	DUE
	optioneering exercise for why clear span crossings are not adopted would be appreciated. LM: Pipes/culverts will have aquatic ecology/mammal crossing implications.		
	FM: Does the EA have concerns about boring under earth embankments on River Gowy? GT: These are likely to be privately owned but maintained and inspected by EA. If going with the FRAP exemption for this activity there are specific criteria around no-dig techniques. If work can't meet standard then need to apply for a permit. EA would look at proximity of the excavated work areas to the embankments and ensure any construction in close proximity to defences has been well considered.		
	SS: If there is any change in personnel, will let WSP know.		

Next meeting

An invitation will be issued if an additional meeting is required.

AGENDA & MEETING NOTES 2

PROJECT NUMBER	70070865	**MEETING DATE**	14 March 2022
PROJECT NAME	HyNet North West Carbon Dioxide Pipeline - DCO	**VENUE**	Teams
CLIENT	Progressive Energy	**RECORDED BY**	WSP
MEETING SUBJECT	DCO and TCPA Flood Risk Consultation with NRW		

PRESENT	Vic Mohun (WSP), Rebecca Potts (WSP), Rachael Chambers (WSP), Christopher Jones (NRW), Rhys Hughes (NRW)
APOLOGIES	Apologies - Frances Marlow (FM) (WSP), Georgie Kleinschmidt (WSP),
DISTRIBUTION	As above plus: Quentin Bahlman (PEL), Trevor Croft (PEL), Lara Peter (WSP), Natalie Corless (WSP)
CONFIDENTIALITY	**Restricted**

ITEM	SUBJECT	ACTION	DUE
1	Introductions		
2.	RC provided summary of the project and DCO		
3.	VM: Provided summary of DCO pipeline in Wales and TCPA Point of Ayr Site. VM presented overview map of the study area, watercourse crossings and AGI/BVS locations.		

ITEM	SUBJECT	ACTION	DUE
3.1.	VM: Presented an overview of what an AGI/BVS is alongside the type of crossings that will be found along various sections of the pipelines. VM: Mentioned a summary of all watercourse crossings within an area of flooding risk from rivers, ordinary watercourses and surface water.		
4.	VM: Provided background information on the Wepre Brook/Alltami Brook above ground pipeline crossing.		
5.	VM: Enquired what freeboard would be recommended and whether a hydraulic model is needed to determine the design flood level of the proposed above ground pipeline. VM: Advised that there is currently no hydraulic model of this section of ordinary watercourse and if it would be acceptable to simply present the fact that the pipe would be located very high within the valley as part of the FCA submission. RH: Advised that a 600mm freeboard of the 100yr plus CC would be needed, however, there is a need to consult with the LLFA to confirm as this is an ordinary watercourse, but the advice is to extend the hydraulic model to cover the ordinary watercourse. RH: Also advised that the NRW would expect to see the output from the hydraulic model and design criteria as part of the FCA at the first submission given the scale and nature of this high-profile scheme. VM: Asked who will assess the model? Would it be LLFA or would it need to go through NRW? RH: Advised that with extending the model, WSP would have to check with the LLFA, but NRW would probably need to review too due to the large scale of this scheme. VM: Asked if there are any set criteria for how the pipe or its foundations either side of the riverbank should be set, any erosion control or anti scour measures? RH: Mentioned that given that it's an ordinary watercourse the LLFA would need the lead and advise WSP on this. VM: Asked will we need a FRAP?	WSP WSP WSP	

ITEM	SUBJECT	ACTION	DUE
	RH: Said yes as it's above the watercourse WSP will need to submit a FRAP. With the Dee crossing this will also need a marine license. VM: Asked if they could share the guidance on this. RH: Said the guidance is on the NRW website and asked if are there any Open Cut crossings on a main river? OC crossings on a main river need a bespoke permit and OC crossings on other watercourses would require a FRAP as there are no exceptions	WSP RH	
6.	VM: Presented a summary of all works that are been carried out at the Point of Ayr site for the TCPA. VM: Queried if, as part of the TCPA application, there is the crossing of a main river will a FRAP need to be applied? RH: FRAPs will be required based on the construction methodology and the guidance available from the NRW.		
7.	VM: Listed the outstanding queries for the DCO and TCPA. RP: Mentioned that WSP have had some responses from NRW for the TCPA and DCO but none from DCWW as of yet. For the outstanding queries, NRW asset and planning team need to be contacted for further information. RH: Said eventually the email requests will reach the asset team and you will be able to get access to the info then. There is a pumping station on an embankment in Talacre, also a hydraulic model available for the POA one which should be able to inform your FCA. The River Dee also has one, Broughton Brook also has one, these can be retrieved to inform the FCAs. VM: Advised that the FCAs would cover the permanent works only and not the temporary or construction works and enquired if this would be acceptable. RH: Mentioned that the FCA needs to acknowledge the need for generic mitigation measures for managing flows during the construction phase as this would then need to be elaborated more within the CEMP.	WSP	

ITEM	SUBJECT	ACTION	DUE
	RH: Advised that NRW are about to raise concerns within the PEIR on the fact that some temporary compounds/construction areas are located within areas at flood risk/floodplains. VM: Asked in relation to the buried pipeline, would it be acceptable to assume in the FCA that the risk to the permanent works from sources e.g., tidal, fluvial, groundwater reservoir etc would be negligible? RH: Advised that this is acceptable but also to yes but need to acknowledge where the sites are in a flood risk area.		
7.1.	VM: Asked about the format of the FCA report, i.e., whether it would be suitable to have one FCA for all the proposals for the DCO in separate chapters and as there would otherwise be a lot of repetitions given the linear nature of the scheme. RH: Mentioned that this is acceptable.		
8.	VM: Asked if NRW can provide guidance on vulnerability classes RH: Advised that would generally be advised by the LPA/LLFA.		
9.	VM: Mentioned that surface water management and drainage strategy is prepared by other consultants and will not form part of the FCAs. RH: This is acceptable as long as reference is made within the FCA report of other documents.		
10.	RH: Advised that the NRW offer a pre-application advice service on FRAPs. Need for FRAPs for Ordinary watercourse crossings will need to be discussed with the LLFAs. RH: Confirmed that the report does not need to be bilingual.		
11.	AOB - none		

Next Meeting

An invitation will be issued if an additional meeting is required.

AGENDA AND MEETING NOTES 3

PROJECT NUMBER	70070865	**MEETING DATE**	25 May 2022
PROJECT NAME	CO2 Pipeline – DCO	**VENUE**	Teams
CLIENT	Eni / PEL	**RECORDED BY**	GK
MEETING SUBJECT	Alltami Brook crossing method		

PRESENT	Frances Marlow, Helena Parsons, Raffaela Cislaghi (Eni), Chiara Caserotti (NRW – Wrexham and Flintshire Env Team), Chris Jones (NRW)
APOLOGIES	Brendan O'flyn (Eni) and Helen Millband (NRW – Geomorphology)
DISTRIBUTION	As above plus: Declan Franklin-Losardo (WSP)
CONFIDENTIALITY	**Restricted**

ITEM	SUBJECT	ACTION	DUE
1.	Introductions		
2.	Brief summary of the HyNet Project		
3.	Brief summary of the DCO Proposed Development and how it fits into the wider Project		
4.	Alltami Brook (See accompanying slides) - Ordinary watercourse (at the point where the pipeline crosses it) - Part of Wepre Brook WFD waterbody - South of Connah's Quay - Deep ravine – area has Made Ground which was put in place possibly as part of A55 construction		

ITEM	SUBJECT	ACTION	DUE
	- Areas of bedrock in channel, cobbles, exposed boulders, dense woodland on left bank, trees on right bank before steep escarpment to right (area of Made Ground) - Upstream of RLB is a culvert with a step down from the apron to the natural channel bed. Gabion baskets line the bank (some of which are starting to fail) - Immediately downstream is a bedrock section, leaning trees and woody debris - PRoW on left bank - Pipeline could be anywhere in 50m width across the channel		
5.	Alltami Brook located in a complex area - Several crossing options have been considered - Pros and cons of each discussed with the design team Trenchless crossings not possible due to the deep valley, meaning HDD can't work at that depth. Also mining tunnels on right bank, means that issues associated with loss of fluid or control of directional drilling. Also potential risk of creating a pathway for contamination if come across old mine water during drilling. Auger boring would require a 15m deep excavation pit through bedrock. Culvert the brook, and bury pipe above the culvert. Advised not to be a suitable option (NRW has a 'no culvert' policy) + WFD and ecological concerns Pipeline as a bridge but operational and inspection and maintenance requirements. Visual implications. Alternative pipeline crossing location / route realignment. Alltami brook is similar for quite a distance. More risks with mines in other locations, and A55 constraint to the south (would have to be crossed twice, plus Ancient Woodland and quarries)	NRW request more detail about why alternative locations were not feasible. NRW seek further justification of why a pipe bridge is not feasible	1/6/22

ITEM	SUBJECT	ACTION	DUE
6.	Proposed crossing technique = open cut crossing - Excavate 6-8m below ground level. Lay pipe and replace. - Temporary culverting OR temporary dams and pumping before and after and then reinstatement - Cut bedrock, and replace with concrete and scour protection (designed at detailed design) - Concerns around BNG (loss of river units and natural bedrock). Looking to enhance watercourses elsewhere within the catchment. Less intrusive than other possible methods such as the culverted watercourse option. - WFD compliance – option complies with no-culvert policy. Scour protection would have to be implemented to avoid geomorphic impact – determined at detailed design - WFD compliance – need to show we won't prevent watercourse becoming natural in the future. Before the A55 was constructed, the river meandered but now it's been culverted and straightened. Pipeline has a design life of 25 years – propose that in the lifetime, this brook is not going to be reaching natural conditions due to A55.	NRW request more detail about why methods were chosen	1/6/22
6.	Mitigation - The Alltami Brook is in Fairly Good condition, so enhancement to good might be difficult given constraints - Are there any NRW schemes locally which could benefit from additional funding as a means to offset WFD/BNG impacts?	CJ – to discuss with colleagues. Management of scour? Ful response to WSP by week commencing 13 June.	13/6/22
7.	CC: The Alltami Brook is unlikely to have been straightened as a result of the A55. (Noted although		

ITEM	SUBJECT	ACTION	DUE
	historical mapping does indicate the made ground and channel straightening has occurred within the past 40 years and likely to have been at a similar time to the road construction). Also, 25 years is a long time – still need to be mindful of improvement within these timescales given that there is increasing pressure to be improving the condition of rivers and streams..		
8.	CJ: Has WSP been in discussion with FCC as LLFA? FM : FCC have been struggling with staff availability. Still not managed to have a meeting.		
9.	CJ: Why was a pipeline bridge ruled out? FM: Regular inspections and maintenance and safety risk. Preference for underground pipeline and not to have any exposed sections of pipeline		
10.	FM : Improvements on other watercourses within BNG? Would that satisfy for WFD mitigation? CJ : NRW don't tend to use BNG metrics. CJ would need to check this with colleague as well. HP: Stepwise approach – does work alongside BNG process. Eliminate issues within the design where possible. Where issues can't be designed out, then we provide mitigation.	CJ to check with colleagues around suitability of BNG metric for WFD mitigation	13/6/22
11.	CC: Outline the feasibility of different locations? E.g. crossing agricultural land? FM :Very similar upstream and have to avoid residential areas by a certain distance. Can cross south but would need to cross A55 twice and restricted by quarries and ancient woodland.		
12.	Other scheme design elements - Wepre Brook. Was trenchless but that will now be open cut. Less concerned about quality at this point. Not bedrock, so easier to reinstate bed at this location. Ordinary watercourse. - Little Lead Brook – outfall from AGI. Hopefully set back from watercourse. Ordinary watercourse.	Why was this changed to trenched? RC to find out.	1/6/22

ITEM	SUBJECT	ACTION	DUE
	- Broughton Brook and Sandycroft Drain = Main Rivers. Both trenchless crossings. Both fairly poor condition. CC: Pointed out that the Sandycroft pipeline location appears to be close to residential properties so does this mean crossing at Alltami Brook could be moved closer to residential properties?		
13.	NRW aiming for WC 13th June for responses.	WSP to confirm DCO Application date.	1/6/22

Next meeting

N/A

AGENDA & MEETING NOTES 4

PROJECT NUMBER	70070865	**MEETING DATE**	19 July 2022
PROJECT NAME	HyNet CO2 Pipeline DCO	**VENUE**	MS Teams
CLIENT	EPUK	**RECORDED BY**	FM
MEETING SUBJECT	Meeting subject		

PRESENT	NRW: Chris Jones (Planning Lead), Oliver Lowe (Geomorphology), Chiara Caserotti (Wrexham/Flints Environment Officer), Stefan Le Roy (Hydrogeology), Matthew Ellis (Ecology) Eni UK, together with EPUK: Dan Hooley, Axel Tanty, Raffaella Cislaghi PEL: James Glass WSP: Rachael Chambers , Declan Franklin-Losardo, Helena Parsons, Frances Marlow, David Chatterton, Luke Mitchell, Akshat Vipin
APOLOGIES	Apologies: George Nuttall (NRW)
DISTRIBUTION	As above
CONFIDENTIALITY	**Restricted**

ITEM	SUBJECT	ACTION	DUE
	JG: Set out the background to this meeting. Provided context with previous NRW meeting, comments and suggestions.		
	JG: Explained why the A55 culvert cannot be used. JG: Explained that CO2 pipeline is more significant than a 'traditional' pipeline/utility diversion. An image showed that the working width typically used for pipelines of a similar diameter to what is proposed (36inch). The pipeline would be approximately 8		

	tonnes per lifted pipe length, buried approx. 1.2m below ground level. The working width is therefore up to 32m so that these logistics can be accommodated. The approximate distance between the A55 and the existing Alltami Brook culvert is only approx. 12m. This would therefore require a closure of the Eastbound carriageway for 5-6months. This also assumes that it can be built within the artificial embankment of the road. The material of this embankment is unlikely to be suitable for a buried pipeline. Works to the A55 embankment would also risk compromising its function of supporting the road. Discounted due to scale and space but it would also be a difficult operation to ensure operation and safety of the road. Another constraint to this option is a high voltage overhead cable in this area which would be an expensive and complicated option to reroute.		
	CC: Asked if the working width would therefore mean that a 32m length of the Alltami Brook would be affected. JG explained that during construction phase, up to 32m width would likely be temporarily culverted with vegetation removed. However, this would be kept to the minimum practicable and only the width of the pipeline + 1m either side would be permanently affected. The temporary working width could potentially be reduced from up to 32m as there would not need to be top soil stored within the watercourse section. (post meeting note: WSP are assessing a 32m working width in the ES)		
	JG: Explained why a pipeline bridge is not a suitable option. Health and safety concerns regarding public climbing on the pipeline and falling. Pipe bridges have typically not been built for this size of pipe in the UK for a number of years.		

	It is general best practise to keep the pipeline buried to prevent health and safety incidents. Duty under CDM Regs to design-out known risks where there is a viable alternative. OL: Challenged that other utility providers still install pipeline bridges and this is the first case that OL has heard of this safety requirement being a reason to discount this approach. JG: Pointed out that this area is next to a wedding venue, residential area, PRoW and there are no manned facilities nearby. OL pointed out that the location was surrounded by field, houses are a distance away and the closest building was the wedding venue (not its sole use), which may only be used every other weekend and is a few hundred metres away, across fields from the site. OL: Would like to see further information to justify discounting pipe bridge due to public safety risk. If HSE can confirm this reason, then NRW will not be likey to object. JG: Explained that in the very rare event of a leak, pressurised CO_2 gas of -30°C would leave pipe and sit in the valley and cause a noxious atmosphere, impacting biodiversity and human health risk. For context, if a pipe was buried and it leaked, it would be contained below ground until it would blow a localised crater, land above would bowl and send CO2 upwards. JG: Stressed that this was a very rare event. JG: Confirmed that the pipe is delivered in 12m sections which are then welded together on site.	JG to provide H&S guidance / standards used.	29/07/22
	JG: Explained why HDD cannot be used to install the pipeline under the watercourse below ground level. Pipeline diameter and width can only bend a certain amount due to elastic radius of a steel pipe, so in this case the HDD crossing would be 450m in length to give 7m cover between pipeline and bed of the brook. JG showed the likely extent of this on the map and a		

	photograph to provide context from another project in Canada. HDD was considered at feasibility stage and was discounted due to physical constraints. HDD would also route the works through shallow coal measures (there have been extensive past coal mining works in the area with some historical records shown on the presentation), where the ground conditions are fractured and the rock is weak. In order to accommodate the 36” diameter pipe, the hole made by the HDD rig would need to be 48” diameter. The hole would need to be 7m below bed level to prevent this impacting on the watercourse. In order to make the hole, high density, high pressure mud is forced through the gap and backreamed. If the drill meets a void, there is a risk that the drilling mud fluid would breakout, causing unknown environmental consequences. There is also a risk that a breakout could happen in the watercourse itself causing pollution. It is currently considered that the pipeline would go through two areas of coal mining works. However, Coal Mining Authority Records don’t exactly match the geophysical surveys, so there is a risk that these could be encountered elsewhere. Furthermore, the landowner also states that approximately three times more coal was removed than declared. Works in areas of coal mining have stability and pollution risk, including bentonite fracking polluting a wide area. OL: Thanks JG for the context provided for the HDD option.		
	CC: Asked if HDD could be done under the A55 JG: Explained that the pipeline cannot run parallel / under the road due to maintenance and H&S issues. This would also not avoid the coal mining risk. The A55 cannot be crossed twice (to bring the pipeline south). JG explained there were more coal		

	mining areas as well as an active quarry south of the A55. HDD causes long term settlement so if this is put under a road it could cause problems of settlement and impact the existing road for years into the future and cause further road closures. Highways Authority would not allow this.		
	JG: Explained cathodic protection to protect any scratched section of the pipeline from rust (by impressing free electrons into the pipeline). HDD method would likely scratch the coating on the pipe during installation, by virtue of the works involved. Through areas of historic coal mines, there is high ground conductivity, therefore the cathodic protection system would likely 'short-circuit' and may not be able to effectively protect the whole length of the crossing. As a result, within 5-10 years the pipeline may be non-operational and need replacing.		
	JG: Explained why auger-boring has been discounted. Boring would involve digging a trench as long as the pipe length to be buried (this needs to cover existing brook width and the historic meanders), at the required depth to be >1.2m below bed level. The trench would be as wide as necessary to be a safe excavation. Therefore, this would require significant earthworks. This is made more difficult through made ground (right bank) with potential for contaminated land and the risk of encountering historic coal mines.		
	OL: Pointed out that the auger boring pit would still be reasonably close to the river channel. OL: Asked how deep under the riverbed is the bedrock. JG explained that the riverbed is bedrock. OL: Stated that, in WFD terms, a high risk activity is anything with hard engineering of the river bed. OL provided an example: replacing gravel bed river with a concrete ford.		

	There have been some applications to modify bedrock on natural falls to enable fish passage, but they have all been refused as they would have set a dangerous precedent. OL noted that this project would be replacing bedrock with similar density (concrete) and elevation. OL: Asked about the bank side material. DH: Confirmed that the right bank has soft soils due to infill from the A55 construction. The left bank has less infilled material but had a historic railway line. The infill material has resulted in the straightening of the watercourse. OL: Asked if the project could look to restore some of the original sinuosity in the channel. JG: Recognised that a lot of the material would be removed anyway but it would have to be taken away with poor road infrastructure nearby. JG to look into this further.	JG to look at feasibility to increase sinuosity through this reach	29/07/22
	JG: Questioned if NRW would allow open cut method at all? If not allowed then auger boring could be adopted. However, it is important to consider that due to the location and existing conditions, auger bore method would have other environmental impacts. There would also be a notable difference in construction duration between the methods - Open cut would be approximately 3 weeks work, whereas auger boring would take approximately 5-6 months. OL: Commented that the difference of environmental impact on the riparian zone between open cut and auger bore is not that significant OL: To discuss within NRW and confirm if open cut crossing would be acceptable. JG: Confirmed there would be up to approximately 3m depth of bedrock removal to install the pipeline through an open cut method. OL: Commented that the best option for NRW (i.e. from an environmental perspective) is likely to be the	NRW to advise on the options presented.	29/07/22

	open span pipeline. NRW request more information on why this is not an acceptable method. Post-meeting note from NRW: in its advisory role as a statutory consultee to the DCO process, it is not for NRW to 'allow' proposals or otherwise – this decision would be for the Examining Authority, in consideration of NRW's advice along with the views of the applicant and other interested parties. Post-meeting note from NRW: NRW is unable to determine this with the information currently available and is not in a position to pre-determine the assessment. When consulted on the DCO submission by the Examining Authority we would review the full information submitted and provide our advice accordingly.		
	CC: Asked if other route options for the crossing have been considered. JG: Confirmed a feasibility study has considered many route alignments. The longer the pipeline becomes there are more stakeholders and the DCO process has compulsory purchase powers – therefore longer routes would impact more landowners, as well as other potential constraints. AV: Confirmed that the DCO application will include an options assessment to be presented in the ES, which considers the alternative routes including a route south of A55. CC: Asked if the optioneering considered routing the pipeline along the road north of this location (through Northop Hall). JG: Explained that this would require the road (north of this location) to be closed for approximately 1 year and would be difficult to justify when there are other viable options that are away from residential dwellings and do not impact them, in fields and are shorter. There is also limited working width along the road. DH added that the Brook is still incised at this location. Bridge is masonry arched.		

	ME: Advised to minimize impact on woodland communities (particularly Annex 1 woodland and protected species). ME: Also enquired whether adjoining areas of Annex I woodland could be legally secured and appropriately managed as an enhancement measure. It was suggested that this may be worth pursuing with the Local Planning Authority's ecologist. JG: Confirmed that avoiding and/or minimising impact on woodland has been integral to the design development.		
	HP: Clarified that permanent easement is 24m which would have restrictions on vegetation replanting, to avoid impacting the pipe and any requirement for maintenance/repair access. If the brook is crossed via open cut, there would be loss of trees on the bank of the brook for a 32m section. Trees cannot be replanted within 24m around the pipe (only hedgerows and scrub) but can be replanted outside of this easement. HP: Asked ME to consider this in his advice OL: Asked if pipe was bridged could trees be planted nearer? JG: Clarified that clear span and the embankment required would likely lead to more vegetation loss. For auger boring option, trees on banks would be retained. But trees further away may be lost as this would require more earthworks on the south bank (closing Pinfold Lane).	ME	
	HP: Asked if project team could get an opinion on WFD compliance from NRW CJ: To take information away and provide NRW's response outside of the meeting. Asked JG provide information on which standards/regulations pertain to limiting the use of the open span crossing option	CJ to respond to queries regarding Alltami Brook crossing method	29/07/22
	FM: Asked if flood modelling would be required for the clear span option.	CJ to discuss constraints with	

	CJ: Will speak to flood colleagues to confirm outside of the meeting OL: Commented it will need to be considered but not likely to be a constraint due to the upstream constriction at the existing A55 culvert.	flood risk colleagues	29/07/22
	SLR: Asked if any options appraisals have been prepared on the various construction methods for this with more detail. JG: Confirmed only internal options review paper has been completed for Alltami Brook. More detail has not been completed because of the involvement needed from contractors. Design development has been collaborative between engineering and environmental factors – a detailed options appraisal considering all temporary and permanent works for every crossing has not been undertaken. SLR: Asked how long it would take to complete? JG: Confirmed several months as there are a limited number of contractors with the capability/equipment to appraise all methods. It could be done by the main works contractor at a later stage. Contractor information would be useful but not possible within the intended submission programme. CC: Commented that NRW could be criticised if it didn't ask about other options SLR: Commented that options to be reviewed based on time/cost vs regulatory constraints. HP: Commented that WSP need to understand chosen method to assess effectively in the ES. RC/AV explained that the EIA is assessing the worst case of the trenchless methods. But each crossing is assessed as either open cut or trenchless (and not assessed for both options) HP: Stated that project team need to know NRW's opinion regarding WFD compliance and mitigation requirements		
	AV: Confirmed the DCO submission is planned for late Q3 2022		

Annex B

WFD SCOPING FOR COASTAL AND TRANSITIONAL WATER BODIES

ANNEX B - WFD SCOPING FOR COASTAL AND TRANSITIONAL WATER BODIES

HYDROMORPHOLOGY

Table B.1 assesses the potential impact of the Proposed Development against the WFD hydromorphology receptors for the screened in surface water body (Dee (N. Wales)).

Table B.1: WFD scoping of the Proposed Development activities against WFD hydromorphology receptors for screened in surface water body (Dee (N. Wales))

Consider if the Activity may Impact hydrogeomorphology receptors	Risk to receptor	Justification
Could the Proposed Development impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status?	Dee (N. Wales) (GB531106708200)	
	No	Waterbody classified as Moderate
Could the Proposed Development significantly impact the hydromorphology of any water body?	Dee (N. Wales) (GB531106708200)	
	No	The Proposed Development activities are insignificant compared to area of the WFD water body. The trenchless crossing techniques have been chosen because they avoid activities within the Dee water body that could cause impact to the hydromorphology of the water body. No impacts are, therefore, expected from either the construction or operation phases of the Proposed Development. The Proposed Development is not expected to significantly impact the WFD objectives set for the water body.
Is the Proposed Development in a water body that is heavily modified for the same use as your activity?	Dee (N. Wales) (GB531106708200)	
	No	The water body is not designated as heavily modified due to pipeline infrastructure. Therefore, the Proposed Development has a new function unrelated to the existing waterbody modification.

BIOLOGY

Table B.2 assesses the potential impacts of the Proposed Development against the WFD biological receptors for the screened in surface water body (Dee (N. Wales)).

The assessment against biological receptors requires consideration against the presence of lower sensitivity habitats. The Proposed Development could potentially impact upon:

Lower sensitivity habitats:

- Intertidal soft sediment; and,
- Rocky shore

Table B.2: WFD scoping of the Proposed Development activities against WFD biological receptors for the screened in surface water body (Dee (N. Wales))

Consider if the Activity may Impact biological receptors	Risk to receptor	Justification
Is the footprint of the Proposed Development 0.5km^2 or larger?	Dee (N. Wales) (GB531106708200)	
	No	The footprint of the Proposed Development is smaller than 0.5km^2.
Is the footprint of the Proposed Development 1% or more of the water body's area?	Dee (N. Wales) (GB531106708200)	
	No	The footprint of the Proposed Development is less than 1% of the water body's area.
Is the footprint of the Proposed Development within 500m of any higher sensitivity habitat?	Dee (N. Wales) (GB531106708200)	
	No	The footprint of Proposed Development is not within 500m of any higher sensitivity habitat.
Is the footprint of the Proposed Development 1% or more of any lower sensitivity habitat?	Dee (N. Wales) (GB531106708200)	
	No	The footprint of the Proposed Development will not exceed 1% of any lower sensitivity habitat within the Dee (N. Wales)) water body.
Biology - Fish		
Is the Proposed Development in an estuary and could it affect fish in and outside the estuary, could it delay or prevent fish entering it and could affect fish migrating through the estuary?	Dee (N. Wales) (GB531106708200)	
	Yes	The Proposed Development includes a trenchless crossing of a transitional section of the River Dee, which could impact fish within the estuary through vibration, noise, and water discharges.
Could the Proposed Development 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)?	Dee (N. Wales) (GB531106708200)	
	Yes	The Proposed Development trenchless crossing construction activities could create vibration, noise, and water discharges that could impact the behaviour of fish within the waterbody.

Consider if the Activity may Impact biological receptors	Risk to receptor	Justification
Could the Proposed Development cause entrainment or impingement of fish?	Dee (N. Wales) (GB531106708200)	
	No	The Proposed Development has been proposed to prevent disruption to the River Dee (Afon Dyfrdwy). The trenchless crossing techniques have been chosen because they avoid activities within the Dee water body that could cause entrainment or impingement of fish. The trenchless crossing will be in a watercourse that is hydrologically connected to the estuary (tidal reaches), but not within the estuary itself.

WATER QUALITY

Table B.3 assesses the potential impact of the Proposed Development against the WFD water quality receptors for the screened in surface water body (Dee (N. Wales)).

Table B.3: WFD scoping of the Proposed Development activities against WFD water quality receptors for screened in surface water body (Dee (N. Wales))

Consider if the Activity may Impact water quality	Risk to receptor	Justification
Could the Proposed Development affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)?	Dee (N. Wales) (GB531106708200)	
	No	The trenchless crossing techniques have been chosen because they avoid activities within the Dee water body that could cause a release of sediment into the channel, affecting water clarity and nutrients. However, any sediment release is unlikely to have a significant impact due to dilution within far larger waterbody area. The risk of sediment release would also be managed through the CEMP.
Is the Proposed Development in a water body with a history of harmful algae?	Dee (N. Wales) (GB531106708200)	
	Yes	History of harmful algae
Is the Proposed Development in a water body with a phytoplankton status of moderate, poor or bad?	Dee (N. Wales) (GB531106708200)	
	No	Good phytoplankton status
If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if the chemicals are on the Environmental Quality Standards Directive (EQSD) list.	Dee (N. Wales) (GB531106708200)	
	No	The latest chemical status of the water body is 'Fail', indicating high level of contaminants within sediments. However, any chemicals released are unlikely to have a significant impact due to dilution within the far larger water body area, and the risk from sediment disturbance would also be managed through the CEMP. A trenchless crossing method will be used to cross the River Dee. The pipeline depth below riverbed would be a minimum of 8m for micro-tunnelling, and a minimum of 15m for HDD. This will prevent sediment disturbance and consequently minimise the risk of sediment bound chemicals being released into the water body. Additionally, the use of chemicals on the EQSD list are not proposed for construction activities within the watercourse catchment.

Consider if the Activity may Impact water quality	Risk to receptor	Justification
If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if it disturbs sediment with contaminants above Cefas Action Level 1.	Dee (N. Wales) (GB531106708200)	
	No	The quantity of contaminants above Cefas Action Level 1 in the local sediment is unknown. However, sediment disturbance is unlikely to have a significant impact due to dilution within the far larger water body area, and the risk of sediment release would also be managed through the CEMP. Moreover, a trenchless crossing method will be used to cross the River Dee. The pipeline depth below riverbed would be a minimum of 8m for micro-tunnelling, and a minimum of 15m for HDD. This will prevent sediment disturbance and consequently minimise the risk of sediment bound chemicals being released into the water body.
If your activity has a mixing zone (like a discharge pipeline or outfall) consider if the chemicals released are on the Environmental Quality Standards Directive (EQSD) list.	Dee (N. Wales) (GB531106708200)	
	No	Use of chemicals on the EQSD list are not proposed for construction activities within the watercourse catchment.

PROTECTED AREAS AND INNS

Table B.4 assesses the potential impact of the Proposed Development against the WFD Protected Areas and INNS receptors for the screened in surface water body (Dee (N. Wales)).

Table B.4: WFD scoping of the Proposed Development activities against WFD Protected Areas and INNS for screened in surface water body (Dee (N. Wales))

Consider if the Activity may Impact Protected Areas or INNS:	Risk to Receptor (Yes/No)	Justification
Is the Proposed Development within 2km of any WFD protected area?	Yes	Proposed Development is within the Dee Estuary/Aber Dyfrdwy SAC, SPA, and SSSI.
Could the Proposed Development introduce or spread INNS?	No	Proposed Development activities are unlikely to introduce INNS, or to spread INNS that are present in the Dee (N. Wales) watercourse and estuary. The Applicant has consulted Natural Resources Wales (6 April 2022. See the **Attachment 12a** from the Marine License Application). This was to ensure specific concerns for key aquatic receptors and potential invasive non-native species (INNS) for watercourse crossings were addressed and agreed, such that suitable avoidance and mitigation methods can be implemented to reduce risk of harm to a reasonable and acceptable level. The main avoidance measure is to utilise a trenchless crossing method to cross the River Dee. The pipeline depth below riverbed would be a minimum of 8m for micro-tunnelling, and a minimum of 15m for HDD. Biosecurity measures, such as the "Check, Clean, Dry" principles, will also be implemented to prevent INNS establishment (**D-BD-042** of the **REAC**) in which, where INNS are located and within the construction corridor, engagement of an INNS specialist will be sought whom will provide options for treatment and or removal in advance of

Consider if the Activity may Impact Protected Areas or INNS:	Risk to Receptor (Yes/No)	Justification
		construction. Any remaining stands of INNS will be subject to exclusion zones which will be clearly and physically demarcated and enforced around areas of invasive species to avoid spread or propagation. The extent of buffer will be determined by the species and in consultation with the ECoW. Biosecurity measures, as detailed within a Biosecurity Management Plan to be prepared at detailed design will be implemented during construction to prevent the spread of INNS.

Annex C

BASELINE INFORMATION

DEE (N. WALES)

DEE ESTUARY

Baseline data for Dee Estuary

Watercourse name	Dee Estuary
	Water feature type: Transitional
	Catchment area: 136.7km^2
	Key hydraulic connections:
	Surrounding land use: Rural, industrial, urban
	River Condition Score:
Catchment Characteristics	Major estuary with extensive mudflats and saltmarsh habitat, with entire estuary area designated as a SAC, SSSI and SPA. Land use is a mix of rural agriculture, industrial, urban areas (Flint, West Kirby, Neston, Heswall, Connah's Quay and the city of Chester at the historic head of the estuary).

Watercourse name	Dee Estuary
Catchment Hydrology	Estuary is macrotidal, with a 7.7mAOD tidal height on a spring tide and a 4.1mAOD tidal height on a neap tide. Approximately 90% of the estuary area is estimated to dry out in a large spring low tide.
Historical Channel Change	The Dee estuary is considered heavily modified and has been significantly altered in the last few hundred years due to industrialisation. The planform of the estuary has not significantly changed, but the banks have been heavily modified. A tidal weir at Chester (originally constructed in the 11th century) has long changed the natural tidal regime of the estuary, highlighting the heavily modified nature of the watercourse.
Biological	
Fish	Field surveys were conducted on 08-0 March and 07-08 May 2022, with 10 sampling locations surveyed in March, and nine sampling locations surveyed in May 2022. A total of nine fish species were recorded, including two SPI's, sea trout and smelt *Osmerus eperlanus.*
Invertebrates	Surveys were conducted on 08-09 March and 07-08 May 2022. Sample analysis is currently ongoing, and results will be presented when available. Invertebrates will remain scoped in for this watercourse as a precaution.

Watercourse name	Dee Estuary
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte habitat identified during the aquatic habitat walkovers.
Physico-Chemical	
Transparency	Water clarity was noted to be very low when sampled in 08-09 March and 07-08 May 2022. No long-term monitoring data is available.
Thermal Conditions	Temperature ranged from 6.2 -7.6 °C when sampled on 08-09 March 2022 and from 15.3-18.0°C when sampled 07-08 May 2022. No long-term monitoring data was available.
Oxygenation Conditions	Oxygenation conditions were recorded at 10 sampling locations in 08-09 March and 07-08 May 2022; detailed analysis of this data is currently ongoing, however the oxygen levels were recorded as very high at all stations.
Nutrient Conditions	No data was available.
Priority Hazardous Substances	No data was available.
Hydromorphological	
Depth Variation	Unobservable – Dee estuary has significant areas of exposed sand banks and saltmarsh habitat. Depth increasing significantly as it approaches the open sea.

Watercourse name	Dee Estuary
Quality, Structure and Substrate of the Bed	Dee estuary has extensive sand, mud and saltmarsh deposits.
Structure of the Intertidal Zone	Extensive saltmarsh habitat in the upper estuary on the right banks. These give way to extensive sand and mud banks as it approaches the open sea, with ephemeral deeper channels from freshwater input.
Freshwater Zone	Freshwater influence significant near the estuary head. Mean fluvial discharge estimated to be $35m^3/s$ at Chester Weir.
Wave Exposure	Banks at the mouth of the estuary reduce wave penetration into the estuary, although significant wave action can occur during high spring tides, especially on the English shore. The main source of sediment to the estuary is the Irish Sea, although erosion of the glacial till cliffs and the suspended load of the River Dee provide secondary sources.