HyNet North West

WITHOUT PREJUDICE WATER FRAMEWORK DIRECTIVE (WFD) DEROGATION CASE FOR ALLTAMI BROOK CROSSING

HyNet Carbon Dioxide Pipeline DCO

Planning Act 2008

The Infrastructure Planning (Examination Procedure) Rules 2010 - Rule 8(1)(c)

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1. STATUS OF THIS SUBMISSION

1.1.1. The Applicant has included a trenched crossing of the Alltami Brook in the DCO Proposed Development Application as it considers this to be the best option in all the circumstances. The Applicant, as set out in the Water Framework Directive ("WFD") assessment **[REP4-174]**, submits that this crossing is compliant with the WFD and that consent can be granted. This submission is therefore made strictly on a without prejudice basis in order to prevent delay at the determination stage should more information be required to support a decision under the WFD. The Applicant refers to the submission of without prejudice derogation / Imperative Reasons of Overriding Public Interest (IROPI) cases under the Habitats Regulations in other DCO applications, and as a requirement of the National Networks NPS in some circumstances, as appropriate precedents for this approach.

1.1.2. The Applicant is confident that the conclusion reached in the WFD assessment that the proposal is compliant is correct. However, given that Natural Resources Wales (NRW) do not agree and because of the level of risk to the project if it is determined that NRW's position is correct, the Applicant has prepared and submitted the following:

- A high level design for an embedded pipe bridge;
- Environmental Impact Assessment of that high level design;
- This without prejudice derogation case for the trenched crossing; and
- A change request (Change Request 2) to seek to add an embedded pipe bridge option to the DCO (Work No.43E), where this option would only be used where the Secretary of State finds the trenched crossing to be unacceptable.

1.1.3. With regard to NRW's position that WFD compliance cannot be found because of uncertainty, the Applicant submits that NRW is seeking an unreasonable degree of certainty as regards the proposed trenched crossing of the Alltami Brook through bedrock. The Applicant notes that all decisions under Directives must be made on a reasoned objective basis. The Applicant agrees that the judgment in *Weser* [Case C461/13, cited by NRW] sets out that states cannot authorise projects which may cause deterioration in the status of a water body unless a derogation is granted. Where the WFD is engaged, to grant consent the Secretary of State needs to be satisfied that the development will not cause deterioration at the water body level considered in the RBMP.

1.1.4. The Applicant considers that the WFD assessment sets out, to an appropriate level of certainty, that the crossing proposed will not cause deterioration in the status of quality elements or overall status at the Wepre Brook water body scale, with the mitigation identified in place **[REP4-174]**. The Applicant notes that NRW has provided no competing evidence for their view, which lacks an objective basis and appears to be seeking a degree of absolute certainty, which the Courts have made clear is not required in the interpretation of Directives.

1.1.5. The *Weser* judgement considered the question of what 'deterioration' is but did not engage with the level of evidence required. The Applicant therefore submits that it is appropriate to look at the guidance provided on this point by decisions on other directives, primarily the Habitats Directive, which have directly considered that point.

1.1.6. In the case of Habitats Regulations, the Courts have had cause to consider how the competent authorities under those regulations must reach decisions. It is well-established law that they must reach a conclusion on the basis of objective information, as set out in the *Waddenzee* decision [C-127/02]. It is for the Applicant to provide the information necessary for the decision maker to carry out the consideration; however, the decision maker must act reasonably regarding the level of information or evidence to be required, which must be that required for the purposes of the assessment, not information which may be relevant or contextual rather than being required.

1.1.7. In considering what is required, the Court in *Mynyddd* [R. (on the application of Mynydd y Gwynt Ltd) v Secretary of State for Business, Energy and Industrial Strategy [2017] Env. L.R. 14) determined that for a competent authority under the Habitats Directive to "have made certain that [the project] will not adversely affect the integrity of the [European] site", it must be satisfied that there is **no real (as opposed to merely hypothetical)** risk to the integrity of the site" (emphasis added). The Courts in considering the standard required have stated that "the conclusion to be reached **cannot realistically require ascertainment of absolute certainty** that there will be no adverse effects" [Smyth v Secretary of State for Communities and Local Government [2015] EWCA Civ 174, as quoted and affirmed in Mynydd] (emphasis added). The Applicant submits exactly the same principle applies to the WFD – absolute certainty cannot be required and is not a reasonable standard to seek.

1.1.8. Where certainty cannot be reached, it is acceptable to use assumptions and estimates, however they must be "identified and reasoned". The Applicant has set out a detailed assessment with identified, secured mitigation measures in the WFD assessment. NRW is effectively seeking 'absolute certainty' that water will not be lost to the ground. As the courts have determined, this is not appropriate.

1.1.9. The evidence required must be reasonable to the level of risk identified. The Applicant notes that NRW's written representation states simply that "NRW considers that there may be deterioration of the Wepre Brook waterbody, as a result of the proposed open-cut crossing of Alltami Brook" [NRW Deadline 1 submission **REP1-071**, at 1.1]. No case is made to support this assertion.

1.1.10. The Applicant is cognisant of the considerable weight which must be given by the decision maker to the views of NRW as the appropriate nature conservation body. However, the Applicant submits that NRW have not given proper reasons for reaching its conclusion as it sets out no objective, evidential basis for its conclusions. It accordingly cannot form the basis of a reasoned, objective decision.

1.1.11. The Applicant's position is:

- The trenched crossing applied for is WFD compliant; and
- Derogation is not required and consent can be granted for the DCO as applied for.

1.1.12. However: if the ExA and Secretary of State disagree; then

- An embedded pipe-bridge option has been assessed as an alternative and the requisite information put before the Examination; and
- This without prejudice derogation case for the trenched crossing has been submitted to facilitate determination should it be found that this is required; and
- The Applicant considers that the EIA for the embedded pipe bridge option demonstrates it is not significantly better in environmental terms, and therefore derogation for the trenched crossing should be granted.

1.1.13. However, if it is determined that the trenched crossing is not WFD compliant and that derogation for it cannot be granted; then:

- All the information required to grant a consent for the embedded pipe bridge option will have been submitted and considered and it would be open to the Secretary of State to grant consent only for that option.

2. INTRODUCTION

2.1.1. This document has been prepared on behalf of Liverpool Bay CCS ('the Applicant') and relates to an application ('the Application') for a Development Consent Order (DCO) that has been submitted to the Secretary of State (SoS) for Energy Security and Net Zero under Section 37 of the Planning Act 2008. The Application relates to the HyNet Carbon Dioxide (CO_2) pipeline which constitutes the DCO Proposed Development.

2.1.2. HyNet (the Project) is an innovative low carbon hydrogen and carbon capture, transport and storage project that will unlock a low carbon economy for the North West of England and North Wales and put the region at the forefront of the UK's drive to Net-Zero. The details of the project can be found in the main DCO documentation.

2.1.3. A full description of the DCO Proposed Development is detailed in Chapter 3 of the Consolidated Environmental Statement (ES) submitted at Deadline 4 **[REP4-029].**

2.1.4. As part of the DCO Proposed Development, a watercourse crossing of the Alltami Brook is required, which is an ordinary watercourse within the Wepre Brook Water Framework Directive (WFD) water body (water body reference number GB111067056880). This WFD water body is currently achieving Moderate status and falls within the Dee Estuary Operational Catchment, Dee Management Catchment and the Dee River Basin District (RBD).

2.1.5. In support of the Application, a detailed WFD assessment **[REP4-174]** has been undertaken to assess compliance of the DCO Proposed Development with the objectives set out within the European Union's EC Directive 2000/60/EC of the European Parliament and of the Council (hereafter referred to as the "WFD legislation") (**Ref. 1-1**).

2.1.6. Contrary to NRW's submission [NRW Relevant Representation RR-066], it is not the "Competent Authority" for the DCO for the purposes of WFD in this case, and it is noted that term is not used in the relevant regulations. NRW is not the decision maker, that is the SoS and NRW is not required, as it has submitted, to "secure" compliance with the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (hereafter referred to as "the 2017 Regulations") (**Ref. 1-2**). As noted in Advice Note 18, the 2017 regulations do not apply to the DCO decision as it is not a "relevant function" within the meaning of regulation 3. Therefore, all references made to Regulation 19 of the 2017 Regulations should be to Article 4(7) of the WFD legislation.

2.1.7. Rather, and as set out explicitly in that advice note, the Secretary of State is required to 'have regard to' the river basin management plans required to be put in place under the Water Framework Directive in reaching a decision on the DCO application. Advice note 18 provides: "Having regard to' river basin management plans includes taking account of and considering the environmental objectives and summary of measures contained within the plan when exercising any functions and the effects of those functions on the objectives and measures within the plan".

2.1.8. The WFD assessment was therefore produced to provide the necessary information to the SoS to allow the execution of duties under the WFD legislation when determining the DCO application, including the need to have regard to the River Basin Management Plan (RBMP) (Dee RBMP) (**Ref. 1-3**).

2.1.9. Based upon evidence presented, the Applicant concludes within the WFD assessment **[REP4-174]** that the Application is compliant with the Directive. In addition, the evidence presented within the Hydrogeological Impact Assessment (HIA) report **(**document reference: **D.7.36)** supports the Applicant's position of compliance with the 2017 Regulations.

2.1.10. However, NRW has raised a hypothetical (rather than evidence-based) **worst-case scenario** risk in their Relevant Representation **[REP-071]** where there could be a potential for water flow loss from the Alltami Brook, in and around the installed pipeline, to ground due to the fractured bedrock (the Gwespyr Sandstone) which could potentially underlie the Alltami Brook or be created as a result of the trenching.

2.1.11. NRW state that, *"the fractured bedrock can act as preferential pathways for the transmission of groundwater. The nature of the groundwater-surface water interaction at the Alltami Brook crossing point is currently unknown as is the wider groundwater regime. There is no site-specific ground investigation data currently available to characterise the local geology, hydrogeology, the nature of the interaction with Alltami Brook and the hydrodynamic relationship, if any, between the Brook and anthropogenic features such as the infilled made ground known to be present in the land abutting the southern bank of the brook, local legacy mine workings and weak ground characterised by observed landslips. There is a potential for water flow loss from the Alltami Brook in and around the installed pipeline to ground. Any flow loss could have consequences for the viability of the brook. The local geology to the South has been altered by excavation and mine workings The works required to install the pipeline at the crossing point will require the southern slope to be reworked/excavated as currently this ground does not visually appear to be sufficiently load bearing for the heavy plant required for the excavation and pipeline installation works. This is an added complication to the proposed engineering works".*

2.1.12. These potential worst-case impacts may result in deterioration to the Wepre Brook WFD water body. Should this potential loss of flow occur, NRW state that "*the reduced flow in a watercourse can affect freshwater wildlife and water quality in a variety of detrimental ways and that physical interventions can change the shape and structure of the watercourse so that there is reduced habitat available for certain taxa like fish, invertebrates, or aquatic plants. Consequently, there may be reductions in reductions in dissolved oxygen in the water resulting in pollutants and nutrients becoming more concentrated in the absence of additional water potentially leading to adverse impacts on aquatic wildlife*".

2.1.13. Based upon this hypothetical worst-case scenario, NRW is stating that the Applicant would be non-compliant with the WFD legislation and therefore derogation under Article 4(7) of the WFD is required. The Applicant does not agree with NRW's position that because a theoretical risk of loss of water to ground at some unspecified time in the future can be imagined (but has not been substantiated), that would result in a deterioration at water body level and a trenched crossing is therefore automatically unacceptable. The Applicant submits that the WFD assessment submitted **[REP4-174]** properly considers the contribution the Alltami Brook makes to the Wepre Brook water body. The potential impact is considered in detail against each of quality elements and assessed as resulting in no deterioration at the Wepre Brook water body scale.

2.1.14. The Applicant has set out below supporting information with regards to a precautionary and without prejudice case for derogation in accordance with Article 4(7) of the WFD

2.1.15. The purpose of this report is to provide the SoS with necessary information to support their decision-making in relation to WFD compliance and, if needed, the need for derogation under Article 4(7) of the WFD.

3. PROPOSED WORKS WITHIN WEPRE BROOK WATER BODY

3.1.1. The following activities pertinent to the WFD assessment are proposed within the Wepre Brook water body:

- Trenched crossing of the Alltami Brook;
- Trenched crossing of the Wepre Brook;
- New outfall for the Northop Hall Above Ground Installation (AGI) with a set-back headwall from the bank and connected via an open channel to the Wepre Brook;
- Temporary over-pumping / culverting of the Alltami Brook and Wepre Brook to create a dry working environment for the trenched crossings;
- Vegetation clearance for enabling works;
- Bank reprofiling (and potential slope stabilisation works) at Alltami Brook for enabling works;
- Reinstatement of vegetation and riparian planting;
- Habitat mitigation area at the Alltami Brook location; and
- Habitat mitigation area at the Wepre Brook.

3.1.2. At the Alltami Brook watercourse crossing location, the working width of proposed channel crossing will be kept to a maximum of 4m and the working width within the riparian zone will be kept to approximately 16m in order to minimise potential impacts to the watercourse, as stated within **D-WR-03** of the **Register of Environmental Actions and Commitments** (**REAC) [REP4-235]**.

3.1.3. The proposed pipeline depth is approximately 1.2m below stream bed level at the watercourse crossing location. In addition, the pipeline depth will be approximately 1.2m below surface level across land within the Wepre Brook water body catchment area.

3.1.4. The proposed works relate to the construction phase of the DCO Proposed Development and are therefore temporary in nature with the watercourses reinstated post-construction, as summarised within the **REAC [REP4-235]**.

3.1.5. With regard to potential cumulative impacts, the footprint of these activities is negligible in terms of the water body scale and impacts would be predominantly during the construction phase and managed via the Outline Construction Environmental Management Plan (OCEMP) **[REP4-237]**.

3.1.6. In line with industry best practice for below ground infrastructure, the pipeline would remain in situ at the end of its operational life and therefore would not be removed. The pipeline would be decommissioned in the sense of being taken out of service and left in a safe condition by being grouted for stability thereby enabling the pipeline to be maintained indefinitely. The need to decommission the outfall would have temporary and highly localised impacts during decommissioning only and would be managed via the Decommissioning Environmental Management Plan (DEMP).

4. WATER FRAMEWORK DIRECTIVE

4.1.1. A glossary of key terms associated with the WFD and which are used within this report is provided in Annex A.

4.1.2. The primary aim of the WFD (as set out in Article 1) is to establish a framework for the protection of inland surface waters, transitional waters, coastal water and groundwaters. This framework prevents further deterioration and protects and enhances the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystem (Article 1(a)). In particular, the objective at 4(1)(i) is to is to implement the necessary measures to prevent deterioration of the status of water bodies - the "non-deterioration principle", which is of particular relevance in the context of Article 4(7).

4.1.3. Article 4.1(b)(i) requires Member States to implement the measures necessary to prevent or limit the input of pollutants into groundwater and to prevent deterioration of the status of all bodies of groundwater, subject to the application of paragraphs 6 and 7 and without prejudice to paragraph 8 of Article 4 of the WFD legislation and subject to the application of Article 11(3)(i).

4.1.4. The SoS, Welsh Ministers and NRW must exercise their relevant functions in relation to each RBD so as best to secure that the requirements of the WFD, the Environmental Quality Standards Directive and the Groundwater Direction for the achievement of the environmental objectives, and in particular programmes of measures, are coordinated for the whole of that district.

5. REQUIREMENTS OF ARTICLE 4(7)

5.1.1. Article 4(7) of the WFD makes provision for a situation where the environmental objectives in Article 4(1) of the WFD legislation cannot be met, thereby allowing derogation from its requirements. For a derogation to be granted, the criteria in Article 4(7) must be satisfied.

5.1.2. Article 4(7) states that there will be no breach of the WFD legislation when the following conditions (tests) are met:

- "(a) all practicable steps are taken to mitigate the adverse impact on the status of the body of water;
- (b) the reasons for those modifications or alterations are specifically set out and explained in the River Basin Management Plan required under Article 13 and the objectives are reviewed every six years;
- (c) the reasons for those modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives set out in paragraph 1 [of Article 4(7) of the WFD legislation] are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development, and
- (d) the beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option."

5.1.3. Under Article 4(7) exemptions can be applied for "new modifications" or "new sustainable human development activities". This is called the 'Applicability Assessment'. New modifications are changes to the physical (i.e. hydromorphological) characteristics of a water body. The effects on and risk of deterioration to a classification and / or quality element may be either a direct or indirect result of the new modification. The HyNet Carbon Dioxide pipeline DCO qualifies under the new modifications criteria.

5.1.4. In addition, when applying Article 4(7), the Applicant must also comply with Article 4(8) and Article 4(9) of the WFD legislation.

5.1.5. Article 4(8) requires that the Applicant does not permanently exclude or compromise the achievement of the objectives of the WFD legislation for other water bodies within the same RBD and is consistent with the implementation of other Community environmental legislation. While the interference during construction would be very temporary and does not trigger the WFD, it is agreed that, if NRW are correct and there is a risk of deterioration due to the creation of the crossing, the modification of the bed of the watercourse would be a modification for the purposes of Article 4.

5.1.6. Article 4(9) requires that steps must be taken to ensure that the application of the new provisions, including the application of paragraphs 3, 4, 5, 6 and 7 of Article 4 of the WFD legislation, guarantees at least the same level of protection as the existing Community legislation.

6. CONSULTATION

6.1.1. The Applicant has undertaken numerous consultations with NRW during both the preparation of the DCO Proposed Development and during Examination. The issues surrounding Alltami Brook have been discussed at length during these consultation meetings. It is pertinent to note that NRW did not raise the risk of potential non-compliance with the WFD legislation due to potential future loss of water until the submission of their Relevant Representations **[RR-066]**. Details of consultation with NRW are provided within the Statement of Common Ground (SoCG) **[REP3-026]**.

6.1.2. The Applicant has undertaken further assessment of the hydrogeological conditions at the Alltami Brook location following an action arising from consultation with NRW post submission of their Relevant Representations. This is presented within the Hydrogeological Impact Assessment (HIA) report **(**document reference: **D.7.36)**.

6.1.3. Preliminary findings of the additional HIA report were presented and discussed at a consultation meeting with NRW on 22 May 2023 and 5 June 2023. In addition, the outcomes of the detailed HIA report were presented and discussed at a consultation meeting with NRW on 26 June 2023.

6.1.4. The case for WFD derogation was also discussed with NRW at the meeting on 26 June 2023.

6.1.5. NRW has raised queries regarding uncertainty for WFD compliance due to the absence of ground investigation (GI) and borehole data at the Alltami Brook location. It is relevant to note that during the preparation of the Application, the Applicant was unable to secure land access to the Alltami Brook. This prevented undertaking GI and borehole monitoring to inform the WFD assessment. During the Examination period, the Applicant has secured land access for non-intrusive surveys enabling the collection of field-based evidence but still preventing GI and borehole data collection. However, the use of desk based, historical and non-intrusive field observations to develop a conceptual model of groundwater flows and interactions is a standard approach to environmental impact assessment and the assessment of WFD compliance. The Applicant has kept NRW informed of this ongoing situation and constraints.

6.1.6. In addition, during a consultation meeting, the Applicant offered to NRW to bring forward a bespoke detailed geomorphological assessment of the Alltami Brook during the Examination period, as opposed to deferring this package of work to the detailed design stage, as set out in **D-WR-064** of the **REAC [REP4-235]**. NRW declined stating that the study would not provide information to further inform the WFD compliance assessment. This is recorded in the Statement of Common Ground **[REP3-026]**.

6.1.7. Furthermore, the Applicant offered to NRW to undertake non-intrusive quantitative stream flow gauging upstream and downstream of the proposed crossing of the Alltami Brook, which would have started in circa March 2023 and continued throughout the Examination period. This data would have aided the assessment of stream flows and provided an indication of whether the watercourse is either losing or gaining water to ground. Again, NRW declined this offer stating reasons of margin of error in the gauging data recorded, plus gauging collected during a dry period and which shows substantial differences in the flows between the two gauging stations would be required to potentially derive any conclusive evidence, as recorded in the SOCG **[REP3-026]**. Given the spring/summer season coupled with the dry weather conditions during this period, the Applicant could have collected flow data to support its assessment. The Applicant took the decision not to collect the data though given that NRW had stated they would not endorse the results obtained given the challenges involved with accurately monitoring the flows in Alltami Brook.

6.1.8. NRW has provided no evidence to substantiate the likelihood that the long chain of worst case theoretical possibilities imagined in its submission to the Examination would be likely to occur. Indeed, later in their submission they advise that they consider more investigation is needed to establish if the Alltami Brook is currently losing water to the environment. As set out above, the Applicant has undertaken further investigation to support its application, and has continued to do so into Examination. Consequently, the evidence produced to date shows that the watercourse is gaining, not losing, water. Therefore, there is no clear mechanism present which would allow for a loss of flow from the Alltami Brook to bedrock as a result of the proposed works.

7. WFD DEROGATION

7.1. AIMS AND OBJECTIVES

7.1.1. The aim of this report is to provide the SoS with supporting information for the conclusions of the WFD assessment **[REP4-174]** and the without prejudice case for derogation in line with the requirements of Article 4(7) of the WFD legislation.

7.1.2. The specific objectives of this report are to:

- Summarise the findings and evidence-base to inform the Applicant's position for WFD compliance, as reported in the WFD assessment **[REP4-174]** and the HIA (document reference: **D.7.36**); and
- To provide the evidence-base for the Article 4(7) tests for derogation.

7.1.3. This is a factual report based upon evidence gathered and the analysis of data used to inform the WFD assessment **[REP4-174]** and the HIA report (document reference: **D.7.36**). It is not the intention that this report will conclude whether a case for derogation has been met. The responsibility for determining the derogation case lies with the SoS.

7.2. APPROACH TO DEROGATION

7.2.1. The following guidance documents have been used to inform this derogation assessment:

- NRW, 2017. Guidance for assessing activities and projects for compliance with the Water Framework Directive. Ref: OGN 072 (**Ref. 1-4**);
- NRW, 2017. Water Framework Directive: deterioration in water body status. Ref: OGN 073 (**Ref. 1-5**);
- NRW, 2017. Derogation Determination for Water Framework Directive Article 4(7). Reference number: OGN 077 (**Ref. 1-6**);
- European Commission, 2009. Common Implementation Strategy for the Water Framework Directive (2000/60/EC). Technical Report – 2009 – 027. Guidance document No. 20. Guidance document on exemptions to the environmental objectives (**Ref. 1-7**);
- European Commission, 2017. Common Implementation Strategy for the Water Framework Directive (2000/60/EC). Guidance document No.36. Exemptions to the Environmental Objectives according to Article 4(7). Revision 4 (**Ref. 1-8**); and
- The Planning Inspectorate. 2017. The Water Framework Directive. Advice note eighteen, version 1. Issued June 2017 (**Ref. 1-9**).

7.2.2. NRW's OGN 077 Derogation Determination for Water Framework Directive Article 4(7) has been applied in the preparation of this report.

DEROGATION CASE STRUCTURE

7.2.3. The derogation case is structured as follows:

- Summary of WFD compliance;
  - Alltami Brook (Wepre Brook water body);
- Article 4(7) Applicability Assessment;
- Article 4(7) derogation tests; and
- Summary of derogation case.

DEROGATION CASE DEFINITIONS

Article 4(7) Applicability Assessment

7.2.4. The Applicability Assessment is the first step in the Article 4(7) process to determine whether:

- (a) A new modification to the physical characteristics of a body of surface water / alterations to the level of bodies of groundwater might lead to deterioration / non-achievement of good status / potential; or
- (b) A new sustainable human development activity might lead to deterioration from high status to good status.

7.2.5. The first test listed above includes hydromorphological alterations with potential for direct or indirect effects on WFD quality elements including groundwater status.

7.2.6. The Article 4(7) Applicability Assessment is the mechanism which engages the substantive “Article 4(7) Test” of satisfying conditions criteria in Article 4(7)(a) to (d).

7.2.7. New modifications include alteration to the physical characteristics of surface water bodies, which includes modification to their hydro-morphological characteristics.

7.2.8. It is pertinent to note that any temporary impacts that may arise are a result of a new modification which would have no long-term adverse consequences are not classified as deterioration under the WFD legislation and the Article 4(7) tests would not be required. Therefore, any potential temporary construction, operational or decommissioning phase impacts would not trigger a WFD non-compliance assessment in relation to this Application.

Article 4(7) Derogation Tests

Test a) all practicable steps are taken to mitigate the adverse impacts on the water body concerned

7.2.9. The European Commission advises that the wording “all practicable steps” is analogous with the term “practicable” used in other legislation. It suggests mitigation measures should be technically feasible; do not lead to disproportionate costs; and are compatible with the new modification or sustainable human development activity.

7.2.10. Mitigation relevant to Article 4(7) is only that which aims to minimise or even cancel the adverse impact on the status of the body of water to which the derogation applies. The European Commission’s guidance on WFD exemptions states that any measures can be considered as mitigation under the WFD as long as the benefits are experienced in the water body to which the Article 4(7) assessment is being applied.

7.2.11. The Applicant notes that it has identified what it considers to be all practicable mitigations in the WFD assessment **[REP4-174]** and these are secured as noted in the REAC **[REP4-235]**. Monitoring throughout operation and, where monitoring shows it be necessary, adaptive management is already provided for. The Applicant is not aware that NRW has proposed any further specific mitigations. The information provided in relation to test (a), has considered all mitigation measures relevant to avoid, reduce and mitigate impacts to the WFD water body and WFD quality elements for both surface water and groundwater. The whole lifecycle of the DCO Proposed Development has been considered in relation to design, construction, operation, maintenance and decommissioning where these phases are relevant to WFD status and WFD quality elements.

Test b): the reasons for modifications or alterations are specifically set out and explained in the RBMP

7.2.12. Test (b) requires that where modifications or alterations to a water body require derogation, that the reasons for those modifications and alterations are specifically set out and explained in the RBMP and that the objectives are reviewed every six years. This does not mean that a modification must be set out in the plan at the time it is approved, but rather that it must be added to the plan as a management item going forward.

7.2.13. Consultation has been ongoing with NRW in relation to this derogation case and the derogation case has been specifically requested by NRW. The case for derogation would therefore be included within the next round of River Basin Planning and included within the next revision of the Dee RBMP, should the case for derogation be deemed necessary.

Test c): overriding public interest / benefits outweigh benefits of the WFD objectives

7.2.14. For derogation, either one or both tests under Test c need to be met. Only one part of Test c needs to be satisfied, however both tests may also be met.

7.2.15. The two specific tests are:

- Test c(i): overriding public interest; and
- Test c(ii): benefits outweigh the benefits of the WFD objectives.

7.2.16. "Overriding" means that the reasons for the new modifications raise a public interest that overrides the interest of achieving the objectives of the WFD. This assessment considers whether the benefits to society / the environment of achieving the WFD objectives are outweighed by the benefits of the new modifications to the maintenance of human safety or sustainable development.

7.2.17. The European Commission's guidance on exemptions (**Ref. 1-7**) sets out the basis for distinguishing between the overriding public interest and benefits, which in turn draws upon guidance produced for the Habitats Directive, which is transposed into UK law under the Conservation of Habitats and Species Regulations (2019) (**Ref. 1-10**). The guidance concludes that it is reasonable to consider that the reasons of overriding public interest refer to situations where plans or projects envisaged prove indispensable within the framework of:

- Actions or policies aiming to protect fundamental value for citizens' lives (health, safety, environment);
- Fundamental policies for the state and the society; and
- Carrying out activities of an economic or social nature, fulfilling specific obligations of public services (**Ref. 1-7**).

7.2.18. The application of the exemption under Article 4(7) should be seen in the context of the implementation of other EU or international policies and funding mechanisms. New modifications or new sustainable human development activities, potentially causing deterioration are frequently linked with the fulfilment of the objectives of other policies, including energy.

7.2.19. The Applicant does not accept that there would be WFD deterioration in this case, however, were it to be found that there would, the Applicant would submit that this is outweighed by the need for the development as a whole and the very substantial policy support demonstrating the overall public benefit of this project and its contribution to achieving net zero. The Applicant refers to the need case for the authorised development set out in the Needs Case **[APP-049]** and the considerable policy support for it set out in the Planning Statement **[REP4-022]** The Applicant submits that the benefits of the pipeline would substantially outweigh the impacts of the crossing at water body scale.

Test d): the benefits of the project cannot be achieved by a significantly better environmental option

7.2.20. This assessment includes the evaluation of alternatives, methods, scale, location, design, constraints and environmental impacts.

7.2.21. This requires an assessment of alternative means for proposed new modifications. This can mean alternative locations, scales, designs, development, processes or any other relevant consideration. The Applicant set out its options appraisal in the ES and stands by that assessment. The Applicant has also provided both a bespoke Alltami Brook Crossing options report, as requested by NRW **[REP3-039]**, and the assessment of the embedded pipe bridge option **[CR2-017]**. The Applicant submits that an embedded pipe bridge is not a significantly better environmental option and could not meet the test of being 'significantly' better under (d). Advice Note 18 provides for test (d) that:

- 4.39 To satisfy this condition, Applicants have to demonstrate that the beneficial objectives of the modifications or alterations to the water body made by the Proposed Development cannot be achieved by other means which are a significantly better environmental option, are technically feasible, and do not lead to disproportionate cost. This could include consideration of alternative locations, different scales, designs of development, or alternative processes for example.

7.2.22. An option may be considered a significantly better environmental option if:

- The benefit it delivers is at least equivalent to the benefit that would be delivered by the proposal;
- Its environmental cost is significantly less than the environmental cost of the proposal; and
- It is economically viable and hence a realistic option.

7.2.23. Technical feasibility and disproportionate costs are taken into account with this assessment.

7.2.24. NRW in OGN 077 (**Ref. 1-6**) and the European Commission (**Ref. 1-7**) state that technical infeasibility is justified if:

- No technical solution is available;
- It takes longer to fix the problem than there is time available; and
- There is no information on the cause of the problem; hence a solution cannot be identified.

7.2.25. The European Commission refers to the use of disproportionality in Articles 4(4) and 4(5) of the WFD legislation as being a 'political judgement informed by economic information' (**Ref. 1-7**). When determining whether an option or modification is disproportionately costly, the guidance suggests that the following points are taken into account:

- The assessment of costs and benefits will have to include qualitative costs and benefits as well as quantitative;
- The margin by which costs exceed benefits should be appreciable and have a high level of confidence; and
- Disproportionate cost should also take into consideration the ability of those incurring the cost of the measures, to pay.

7.2.26. A combination of the most cost-effective solutions should be identified to inform the assessment of disproportionate costs.

Uncertainty

7.2.27. In some cases, there is an element of uncertainty associated with some mitigation measures in Test (a). Whilst it may be technically feasible to incorporate a particular measure, there may be some uncertainty if there is either a lack of evidence of successful implementation elsewhere or a lack of underpinning scientific understanding.

7.2.28. NRW has raised a question of uncertainty due to the absence of GI and borehole monitoring data in relation to the Alltami Brook crossing within the Wepre Brook WFD water body. This uncertainty may also have implications for the disproportionate cost aspect; if there is limited evidence that a measure will effectively mitigate an effect, then the cost versus benefit case is weakened.

7.2.29. Levels of uncertainty are assigned using professional judgement based on the following criteria:

- Low: there is some uncertainty related to either the measure's feasibility or the benefit it would result in; however, the measure is likely to be effective.
- Medium: there is a moderate level of uncertainty related to either the measure's feasibility or the benefit it would result in, possibly related to limited scientific evidence of its effectiveness.
- High: there is no evidence of the measure's feasibility or the benefit it would result in, and no scientific evidence of its effectiveness

7.2.30. The Applicant has identified an embedded pipe-bridge as a realistic alternative to a trenched crossing which would deliver an equal benefit (in that it would allow the pipeline to be constructed and operated) to the preferred trenched crossing. The Applicant does not however accept that the environment cost would be significantly less than the trenched proposal when considered as a whole and not looking solely at a theoretical potential loss of water to ground. This is set out in the ES assessment of the bridge option **[CR2-017]**.

7.3. SUMMARY OF WFD COMPLIANCE

7.3.1. A WFD assessment was undertaken in accordance with PINS Guidance Note 18: Water Framework Directive (**Ref. 1-9**) and NRW's OGN 072 (**Ref. 1-4**) to assess the potential construction, operation and decommissioning activities of the Carbon Dioxide Pipeline **[REP4-174]**. The WFD assessment considered all project activities in relation to the objectives set out in Article 4(1) of the WFD legislation. The Applicant engaged with NRW to agree the screening and scoping of WFD water bodies, quality elements that comprise the WFD classification, and the activities required for the DCO Proposed Development.

7.3.2. The without prejudice case for derogation is presented for the Alltami Brook, which is an ordinary watercourse forming part of the Wepre Brook WFD water body. The location of this WFD water body is provided in Annex B. A full list of WFD water bodies screened in for compliance assessment are provided within the WFD assessment **[REP4-174]**.

7.3.3. The classification data for the Wepre Brook water body is provided in the WFD assessment **[REP4-174]**. The Wepre Brook forms part of the Dee Estuary Operational Catchment, the Dee Management Catchment and the Dee RBD. The classification data shows that the Wepre Brook water body is currently achieving Moderate Ecological Status and Moderate Overall Status under the WFD due to phosphates. It is pertinent to note that the DCO Proposed Development will not impact upon phosphate levels within the Wepre Brook water body.

7.3.4. The WFD assessment **[REP4-174]** concluded that impacts would be primarily limited to the construction phase across the DCO Proposed Development and therefore temporary in nature and managed through the OCEMP **[REP4-237]**. Therefore, there would be no long term construction impacts to WFD water bodies and consequently no deterioration in WFD status or prevent the achievement of WFD status objectives.

7.3.5. During operation, the WFD assessment **[REP4-174]** concluded that any impacts would be highly localised and not significant at the WFD water body scale. Therefore, there would be no long term operation impacts to WFD water bodies and consequently no deterioration in WFD status or prevention of achieving WFD status objectives.

7.3.6. During the decommissioning stage, the WFD assessment **[REP4-174]** concluded that impacts due to the removal of AGIs only would have similar impacts to the related construction phase activities and would therefore be temporary in nature. In addition, the decommissioning activities would have a lesser and more indirect potential impact to WFD water bodies. Potential impacts would be managed through the DEMP. Therefore, no impacts to WFD water bodies are anticipated during decommissioning and consequently no risk of deterioration in water body status or the status of any of the WFD quality elements.

7.3.7. With specific regard to the Wepre Brook WFD water body, the WFD assessment **[REP4-174]** also concluded that impacts would be predominantly within the construction phase and therefore temporary in nature and managed through the OCEMP **[REP4-237]**.

7.3.8. The focus of this derogation report is on the trenched crossing of the Alltami Brook. The proposed trenched crossing of the Wepre Brook and outfall from the Northop Hall AGI on the Wepre Brook are mentioned in relation to potential cumulative impacts.

7.3.9. The trenched crossing on the Wepre Brook is within a very constrained and modified reach of the watercourse with artificial bank material (see photographs provided in Annex C). This watercourse will be reinstated to baseline once the pipeline is installed and therefore impacts would be temporary and during the construction phase only.

7.3.10. The outfall would pose no direct modification to the Wepre Brook. The outfall headwall will be set-back from the bank top and therefore no new artificial modification will be introduced to the banks of the Wepre Brook. Drainage discharge from the outfall will be restricted to equivalent greenfield runoff rates. Therefore, no impacts are anticipated to the WFD water body.

7.3.11. Therefore, there would be no long-term or operational impacts to the WFD water body as a consequence of the proposed modifications to the Wepre Brook watercourse. The outfall headwall will be set-back from the bank top and therefore no new artificial modification will be introduced to the banks of the Wepre Brook. Drainage discharge from the outfall will be restricted to equivalent greenfield runoff rates. Therefore, no impacts are anticipated to the WFD water body. In addition, no cumulative impacts are anticipated due to the temporary nature of the construction phase and only the addition of greenfield rate discharge from the drainage outfall, which will be insignificant at the WFD water body scale.

7.3.12. The primary potential impact to the Wepre Brook water body is the trenched crossing of the Alltami Brook. During construction, a trench will be cut through the bed of the Alltami Brook, which is comprised of Gwespyr Sandstone bedrock according to geological records of the area. The trench would be sufficiently deep so that the crown of the laid pipeline is 1.2m below stream bed level. The excavated reach of the Alltami Brook will be kept to a maximum of 4m of watercourse length (commitment **D-WR-063** of the **REAC**) **[REP4-235]**. The stream flow will be maintained throughout the construction phase by either temporary culverting to divert flow from the trench or over-pumping of the water (commitment **D-WR-029** of the **REAC**) **[REP4-235]**.

7.3.13. In addition, the Applicant has committed to the environmental actions and commitments listed in Table 7.1 to eliminate, reduce and manage both construction and operation impacts of the trenched crossing of Alltami Brook. The commitments are listed in the **REAC [REP4-235]**.

Table 7.1 – Environmental commitments relevant to the Alltami Brook crossing (REAC) [REP4-235]

REAC Reference	Description
D-BD-009	Micro-siting techniques will be employed throughout the detailed design of the DCO Proposed Development, including during pre-construction and construction to avoid waterbodies, sensitive habitats, trees (including ancient and veteran trees and trees covered by Tree Preservation Orders and trees within Conservation Areas), hedgerows, etc., as much as practicably possible. Where opportunities exist for routing through existing gaps in hedgerows, scrub and woodlands, avoiding the need to remove vegetation, these will be prioritised.
D-BD-018	A minimal working width at watercourse crossings will be adopted, as far as practicable, to minimise potential impacts of open cut watercourse crossings.
D-BD-048	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.

REAC Reference	Description
D-BD-049	Any habitats within watercourses that have been removed will be reinstated, such as riffles, pools, point bars, berms, large wood, log jams, cross-sectional and planform variation. Any reinstatement will be ensured to not cause other potential impacts, such as increased flood risk.
D-BD-050	Where necessary and practicable, the installation of temporary culverts and causeways/access routes within watercourses will avoid sensitive fish migration and spawning periods: • 1 October to 31 April - European eel, lamprey and salmonids; and • 15 March to 15 June - Coarse fish. The requirement for such structures would be determined during the detailed design stage of the DCO Proposed Development. Where unable to be accommodated outwith fish migration and spawning periods, liaison with NRW/EA will be required with applications for exemptions sought.
D-BD-056	Where fish communities have been identified at a crossing point location, updated baseline surveys will be undertaken prior to works commencing and, where practicable, works will avoid risk of impacts to fish populations through seasonal timings of works to account for the migration and spawning periods of those fish species identified. Where it is not possible to avoid seasonal sensitivities, applications for exemptions from the Environment Agency or NRW will be sought on a case-by-case basis. Only upon receipt of granted exemptions and implementation of any necessary required mitigation can works commence.
D-WR-050	Where practicable, the alignment of the pipeline to be developed during detailed design will seek to minimise potential environmental impacts as far as practicable.

REAC Reference	Description
D-WR-052	A pre-works crossing point survey will be carried out to record channel and bank morphology and features, riparian zone structure, and collect photographic record, so that reinstatement is as close to baseline as practicable. Re-instatement works should be supervised by an appropriately qualified ECoW.
D-WR-056	The Construction Contractor will undertake further consultation with Natural Resources Wales and the Lead Local Flood Authority Planning and Geomorphology Technical Specialists to determine the appropriate depth and extent of the pipeline placement so as not to prevent the future re-naturalisation of the Alltami Brook to a sinuous planform.
D-WR-059	The Groundwater Management and Monitoring plan will set out the monitoring requirements, establish a protocol for the assessment and response to monitoring data and provide methods to assess compliance with the conditions of development consents, environmental protection licences and legislation relating to groundwater and GWDTE.
D-WR-063	The width within which the works for the Alltami Brook Crossing will be contained will not exceed 16 metres within the riparian zone. Maximum width of bedrock channel permanently impacted from removal of bedrock will be no more than 4m.
D-WR-064	A bespoke geomorphological assessment will be carried out by the Construction Contractor to inform: • micro-siting the crossing location of the pipe so that the least sensitive section of river bed is permanently impacted, where practicable, • the detailed design of the permanent works installed as part of the reinstatement of the watercourse after pipe is laid Further engagement with Natural Resources Wales and the Lead Local Flood Authority Planning would be undertaken to

REAC Reference	Description
	inform the methodology of this bespoke geomorphological assessment.
D-WR-065	Geomorphological and ecological monitoring of the permanent works would be carried out, post construction, to ensure the integrity of the reinstated channel and to identify any early intervention that may be required to ensure no deterioration in WFD status. Type, duration and frequency of monitoring is to be determined through the development of the geomorphological assessment and detailed design, and in consultation with NRW and FCC LLFA. Adaptive mitigation would be implemented to maintain the integrity of the reinstated channel.
D-WR-066	Gravel augmentation will occur through the modified reach of Alltami Brook to off-set the potential reduction in spawning habitat. This will be designed in collaboration with the geomorphological assessment.
D-WR-070	The contractor will develop and implement a Surface Water Management and Monitoring Plan to ensure appropriate monitoring of water quality is carried out before, during and after the construction works and that adaptive mitigation is implemented if monitoring shows that existing mitigation measures are not deemed sufficient.

7.3.14. There are also additional REAC commitments **[REP4-235]** to avoid, reduce and minimise potential impacts which have been excluded here given that derogation is not required for temporary and short-term impacts only.

7.3.15. During operation, there would be a localised impact to the Alltami Brook within the Wepre Brook WFD water body due to the trenched crossing and the root exclusion zone for the pipeline preventing the reinstatement of riparian trees in the vicinity of the pipeline crossing. However, the Application includes an extensive mitigation area at the Alltami Brook location for tree planting, which includes the planting of riparian trees to offset the potential impacts as shown in **Figure 3.4 – Landscape and Ecological Mitigation Plan** of the ES **[REP4-190]**.

7.4. ALLTAMI BROOK (WEPRE BROOK WFD WATER BODY)

7.4.1. The Alltami Brook is a gorge located along the pipeline route, south east of the village of Northop in Flintshire, Wales. The UK (OSGB 1936) grid reference for the proposed trenched crossing of the Alltami Brook is SJ 27659 67150, which is Section 5 of the Newbuild Carbon Dioxide Pipeline. The gorge location presents technical challenges for the pipeline crossing of this watercourse. Consequently, an Alltami Brook Crossing Options Appraisal report **[REP3-039]** has been produced. This options appraisal considered the potential watercourse crossing techniques in terms of construction feasibility, safety and integrity during the operational life, eventual decommissioning, land requirements, and environmental impacts to determine the most suitable crossing method.

7.4.2. The Alltami Brook is a narrow bedrock stream which flows in an approximate west-east orientation to the confluence with the Wepre Brook.

7.4.3. The northern slope of the Alltami Brook is lined with mature trees and dense vegetation. The southern slope from its crest to the brook comprises steep made ground with extensive evidence of shallow slope failures along its length. A photographic record of the Alltami Brook is provided in Annex C.

7.4.4. The watercourse was previously modified upstream of the proposed pipeline crossing for the installation of a culvert for the A55 highway (see Annex C). Enabling works included the realignment of the Alltami Brook from a sinuous planform to a straightened reach within the vicinity of the A55 road culvert.

7.4.5. Downstream of the A55 culvert, the Alltami Brook exhibits predominantly semi-natural conditions including in-channel habitats including riffles, pools, and gravel deposits. The watercourse has scattered tree cover in the riparian zone in the vicinity of the proposed crossing and more semi-continuous to continuous tree cover downstream to the confluence with the Wepre Brook. Riverine habitat associated with trees is characteristic of this reach of the Alltami Brook with overhanging branches, large wood and fallen trees. These features create niche habitats for species and channel shading, which helps to maintain cool water temperatures and associated oxygenation levels. Furthermore, the woody material aids the trapping of fine sediments, which may reduce turbidity and trap fine sediments.

7.5. HYDROGEOLOGICAL IMPACT ASSESSMENT (HIA)

7.5.1. A specific HIA (document reference: **D.7.36**) was undertaken to further inform the WFD assessment **[REP4-174]** due to the complexity of the geological and hydrogeological conditions at the Alltami Brook, coupled with the legacy coal mining in the vicinity of the Alltami Brook.

7.5.2. As previously mentioned, the Applicant was unable to collect GI and borehole data to inform the hydrogeological and WFD assessments. Consequently, a conceptual model using field and desk-based information, including historical GI and borehole data, has been used. The development of conceptual models for groundwater and hydrogeological impact assessments is a standard approach for Environmental Statements and widely accepted by planning authorities, NRW and the Environment Agency on many complex schemes such as the A9 Dualling and AQUIND Interconnector DCO project.

7.5.3. The historical borehole data used to inform the hydrogeological assessment are from boreholes which were located approximately 100-150m from the proposed pipeline crossing of the Alltami Brook. During a consultation meeting with NRW on 26 June 2023, NRW acknowledged that these records are sufficiently close to inform an understanding of the hydrogeological conditions and groundwater interactions, as recorded in the SOCG **[REP3-026]**.

7.5.4. The objectives of the HIA were to develop a conceptual understanding of the groundwater flow regime at the Alltami Brook; to consider the potential effects from construction and operation of the pipeline; and to identify key uncertainties in the understanding of site conditions under different flow scenarios. The HIA was informed by baseline information that was collected from multiple, relevant sources including geological maps, memoirs, reports, online resources, historic borehole logs, and field information (observations and photos from walkovers).

7.5.5. A simplified visual representation of the preliminary hydrogeological conceptual site model is presented in Annex D. The preliminary conceptual site model indicates that, based on the current level of understanding, there is likely to be an upwards hydraulic gradient from the bedrock aquifers into the Alltami Brook. The key lines of evidence for this are as follows:

- site walkover observations indicating that the made ground (which sits above the bedrock on the south side of the brook) is discharging water into the Alltami Brook;
- recorded water levels in nearby historic boreholes in the bedrock (same or similar geology) indicating an upwards water pressure following water strikes;
- literature information states that the bedrock aquifers are primarily driven by fracture flow which is laterally discontinuous leading to a ‘compartmentalised’ groundwater flow regime;

- there is no discernible evidence of flow loss along the fault line (running perpendicular and parallel) that follows the route of the Alltami Brook, where fracturing would be expected to be substantial; and
- there is a widening of the watercourse in the area of the fault, without any surface water tributary contributing to flow in the watercourse i.e., there is a groundwater baseflow contribution (site observation).

7.5.6. The presence of nearby mine historic mine workings is also discounted as a possible receptor in terms of acting as a recipient of discharge. The age and shallow depth of the workings suggest any remaining mine voids would be saturated or otherwise have returned to a state of equilibrium. Unsaturated mine voids (i.e., which could act as a recipient of flow) situated hydraulically downgradient of the preferred open cut crossing point are very unlikely based on available information. Additionally, geophysical survey undertaken offers no indication of open mine voids being present.

7.5.7. The conceptual site model considers the potential effects of the preliminary design of the open-cut crossing, which will be excavated into the bedrock. At this stage, there is no evidence of fracturing or fissuring in the bedrock at the proposed crossing point (albeit the Order Limits are 200m wide at this location, which provides benefits for micro-siting of the pipeline to minimise adverse effects). Based on the conceptual site model, any groundwater flow encountered during the excavation of the trench would be upwards from the underlying bedrock, rather than vertically downwards from the watercourse.

7.5.8. Given NRW's concerns in relation to loss of flow in the watercourse through fractures and fissures, a geotechnical ground investigation will be implemented as part of the detailed design. Should the findings of the ground investigation demonstrate that there is evidence of fracturing etc. with potential high permeability flow zones, then the scheme design will incorporate additional mitigation to reduce the risk of 'flowing features'. Such works would normally include a form of grouting (permeation grouting or jet grouting) to effectively 'cut-off' flow in the targeted bedrock zone. The design of such works will depend on the findings of the investigation but is a commonly applied method of ground treatment.

7.5.9. NRW specifically queried erosion rates of the Gwespyr Sandstone at a consultation meeting on 26 June 2023. Whilst the Applicant has not specifically undertaken an assessment of bedrock erosion rates, bedrock erosion rates are typically extremely low and imperceptible, typically between 1.1 and 3.4mm per 100 years (**Ref. 1-11**). This is supported by field observations of moss and algal growth on the bedrock within the channel (see images in Annex C), which is an indication of very low erosive forces given the lack of tolerance of these taxa to fluvial erosion. Therefore, rates of stream bed erosion of the Gwespyr Sandstone bedrock are considered to be occurring over geological timescales with infinitesimal rates of fluvial erosive action on the stream bed.

UNCERTAINTY

7.5.10. The risk of washout of grout, also highlighted as a concern by NRW, can be reduced by using appropriate grout materials and / or accelerators during construction. The long-term performance degradation of the grout within a fissure is also considered unlikely as the grout will be within the rock mass surrounding the structure, and fractures and fissures will be sealed. Effectively, a low permeability plug within the bedrock would be created, eliminating flow zones in the bedrock at the open-cut crossing location. The practice of ground improvement through such methods is commonplace in construction and engineering projects, and has been adopted on other major infrastructures schemes including the Thames Tideway Tunnel and the Lee Tunnel, which are both located within a Principal Aquifer (Chalk) in London, which is a regional resource for public and private water supply. Grouting works would be undertaken in accordance with industry best practice.

7.5.11. The conceptual site model of the Alltami Brook open cut crossing (Annex D) identifies some uncertainties, such as the exact relationship between the Alltami Brook and the surrounding groundwater level of the bedrock aquifer in terms of its seasonal variability and any possible change in hydraulic gradient which may occur is not completely known. However, due to the laterally discontinuous fracture flow conditions and the design mitigation, this is considered to have limited consequences, based upon the evidence gathered. Additionally, under baseline conditions the relationship is expected to be that of a gaining watercourse in terms of groundwater baseflow component. The presence (and extent) of fracturing at the preferred crossing location is also currently not confirmed; however, this uncertainty is also considered manageable due to the design features and other mitigation such as the application of grouting techniques, should this be necessary.

7.5.12. Information obtained from GI will reduce uncertainty in the conceptual model presented and enable a greater understanding of the relationship between the Alltami Brook and groundwater interactions. The data will also be used to inform the micro-siting of the pipeline. Further GI and borehole data will be carried out in this area during detailed design.

7.5.13. Therefore, based upon the criteria for uncertainty stated earlier in the report, the Applicant concludes that the level of uncertainty is **low** with regards to the risk of deterioration due to significant loss of water flow. This conclusion is based upon the evidence presented within the HIA (document reference: **D.7.36**) and proposed mitigation measures.

7.5.14. The HIA demonstrates that there is no a mechanism present that would allow a significant loss of flow from the Alltami Brook, either in the short or long term.

7.5.15. Further, the mitigation measures proposed to protect against deterioration, i.e. impermeable grouting, reinstatement of the channel bed, monitoring and adaptive management, are likely to be effective in preventing any loss of water flows that could occur, as postulated by NRW.

7.5.16. For this reason, the DCO Proposed Development is not considered to be a risk to impacting the WFD status of the Wepre Brook surface water body and is considered by the Applicant to be WFD compliant.

7.6. ARTICLE 4(7) TESTS

APPLICABILITY ASSESSMENT

7.6.1. The DCO Proposed Development qualifies for the WFD derogation Applicability Assessment under the first test stated below:

- Be a new modification to the physical character of the water body or alteration to the level of groundwater which may jeopardise the attainment of good ecological status, good ecological potential, good groundwater status or prevent deterioration.

7.6.2. This is due to NRW considering that the trenched crossing of the Alltami Brook could, under a hypothetical worst-case scenario, result in an alteration to groundwater level, and consequently surface water flows, which could result in deterioration and prevent the attainment of good status for both surface and groundwater. In addition, the hypothetical potential alteration to groundwater flows could result in alterations to water quality within the Wepre Brook water body, including the potential for pathways for mine water contaminants. These potential water quality issues would not be anticipated to extend to the downstream WFD water bodies due to the scale of those water bodies and the dilution the waters would provide.

7.7. DEROGATION TESTS

TEST A) ALL PRACTICABLE STEPS ARE TAKEN TO MITIGATE THE ADVERSE IMPACTS ON THE STATUS OF THE BODY OF WATER

7.7.1. This test involves consideration of the mitigation hierarchy, which is summarised as follows:

- 1: Impact avoidance;
- 2: Impact reduction; and
- 3: Minimise or cancel adverse impacts.

7.7.2. Mitigation measures were considered to avoid, reduce and minimise potentially significant adverse effects during construction, operation and decommissioning.

7.7.3. In the case of the DCO Proposed Development, this mitigation hierarchy has been applied scheme-wide. This derogation case specifically focuses on the application of this mitigation hierarchy in relation to the proposed trenched crossing of the Alltami Brook, part of the Wepre Brook WFD water body.

7.7.4. The proposed trenched crossing of the Wepre Brook and the new outfall from the Northop Hall AGI do not require assessment against the Article 4(7) tests. These activities would present temporary and localised impacts to the water body. As previously stated, any potential temporary construction, operational or decommissioning phase impacts with no long-term adverse effects are not classified as deterioration under the WFD legislation.

7.7.5. Relevant mitigation measures have been identified throughout the project and detailed within the main DCO documentation and with a full description of the DCO Proposed Development provided in Chapter 3 of the ES **[REP4-029]**. Furthermore, specific details of the embedded mitigation measures are provided within the Consideration of Alternatives in Chapter 4 of the ES **[REP4-031]**. This chapter sets out the reasonable alternatives that have been considered during the evolution of the DCO Proposed Development and design process, as set out in Chapter 3 of the ES **[REP4-029]**.

7.7.6. Much of the embedded mitigation within the design of the DCO Proposed Development has arisen from the iterative process of EIA, WFD assessment and options appraisal.

7.7.7. Alternatives considered within Chapter 4 of the ES **[REP4-031]** to avoid, reduce and minimise impacts include:

- Pipeline routes;
- Pipeline designs;
- Pipeline crossings;
- AGIs alternative sites;

- Block Valve Stations (BVSs) alternative sites; and
- Construction Compounds.

7.7.8. In addition, a specific Alltami Brook Crossing Options Appraisal **[REP3-039]** was undertaken for the Alltami Brook watercourse crossing given the complexity of this location. Further information on this options assessment is provided against Article 4(7) Test (d).

Impact avoidance

7.7.9. During the early feasibility stages of the DCO Proposed Development, a pipeline route options assessment was undertaken to inform the preferred pipeline corridor. The details of this assessment are provided within Chapter 4 of the ES **[REP4-031]**.

7.7.10. The design and location of the Newbuild Carbon Dioxide Pipeline needed to consider the requirements and phasing of the wider project. This included exploring opportunities to modify existing infrastructure to reduce the need for constructing additional pipelines, which avoids potential environmental impacts and provides programme and cost efficiencies.

7.7.11. Consequently, a section of the existing Connah's Quay to Point of Ayr (PoA) Terminal Pipeline, which is being repurposed to transport CO_2 as part of the DCO Application, will form an integral part of the project infrastructure. Therefore, all of the proposed route corridor options were developed to connect to the existing Connah's Quay to PoA Terminal Pipeline.

7.7.12. In developing the Newbuild Carbon Dioxide Pipeline route corridor options, the following guiding principles were developed:

- To avoid, minimise and manage impacts upon the environment and local amenity;
- To ensure the transportation of the CO_2 is undertaken safely and securely;
- To optimise the potential socio-economic benefits within the region;
- To be technically viable and constructible with minimum disruption; and
- To be cost-effective.

7.7.13. A three-stage appraisal process was developed to identify the preferred route option for the Newbuild Carbon Dioxide Pipeline as part of the DCO Proposed Development, namely:

- Stage 1: Development and appraisal of strategic corridors;
- Stage 2: Development and appraisal of route options; and
- Stage 3: Refinement of preferred route option and siting.

7.7.14. This appraisal methodology has drawn upon best practice adopted by National Grid in developing new gas and electricity infrastructure (**Ref. 1-12**) intended primarily for major infrastructure projects under the Planning Act (PA) 2008.

7.7.15. The strategic corridor selection relevant to this derogation case is the Stanlow AGI to Flint AGI Pipeline (36" diameter pipeline). During the Stage 1 assessment, four strategic corridors were identified. These were the 'Core' corridor, 'Northern', 'Central' and 'Southern' corridors.

7.7.16. The Core corridor was the least geographically constrained and covered approximately 13km in length and lies predominantly within England, extending for approximately 1km into Wales, where the corridors split into the 'Northern', 'Central' and 'Southern' corridors.

7.7.17. The widths of the corridors varied, primarily due to the consideration of key geographical constraints to avoid, as far as possible, centres of population and environmental features.

7.7.18. A qualitative appraisal was undertaken of the 'Northern', 'Central' and 'Southern' corridor options and considered proximity to industrial emitters including minimising land take and the need for compulsory acquisition, improved environmental outcomes by avoiding or having reduced adverse environmental effects, social and economic outcomes of greater benefit compared to other corridors, and to provide a stronger business case.

7.7.19. The outcome, as reported within Chapter 4 **[REP4-031]**, was the Southern corridor being identified as the preferred option. The reasoning included this route option having less of a direct impact upon international and national environmental designations, including the River Dee Estuary. Consequently, the Core and Southern corridors were taken forward to the Stage 2 Appraisal for the Newbuild 36" Pipeline.

7.7.20. The Stage 2 assessment considered criteria derived from relevant policy, as outlined within Chapter 4 of the ES **[REP4-031]**. Based upon these policy documents, the route options were designed to consider:

- The requirement for and potential location of above ground installations at the beginning and end of each section of Newbuild Carbon Dioxide Pipeline;
- Key environmental designations and environmental features;
- Key planning designations and land use constraints (identified within Local Plans);
- Avoidance of potential engineering constraints (including difficult terrain and complex infrastructure crossings);
- Avoidance of existing major utilities and centres of population;
- Compliance with relevant Health and Safety Executive (HSE) legislation; and

- On-going accessibility and maintenance considerations.

7.7.21. For the Newbuild 36” Pipeline, nine route options were identified within the Core and Southern corridors and were assessed against the criteria listed above. Environmentally sensitive sites were considered within the Stage 2 assessment. These include the River Dee Special Area of Conservation (SAC), areas of ancient Woodland (including that present south of Northop in the vicinity of Alltami Brook and within the Wepre Brook WFD catchment area).

7.7.22. The pipeline route option was subsequently refined following comments received during the Non-Statutory Consultation Period detailed in the Consultation Report **[APP-031]**. Part of the reasoning for the pipeline route alignment were based upon less engineering complexity, particularly in relation to highway and river crossings, fewer potential impacts on key environmental and planning designations, lower construction safety risk with reduced engineering complexity, and a lower cost option.

Impact reduction

7.7.23. The Stage 3 assessment detailed within Chapter 4 of the ES **[REP4-031]** considered refinement of the carbon dioxide pipeline routing and siting, including reducing the loss of water bodies, reducing impacts on watercourses and mature vegetation, including trees and woodland habitat.

7.7.24. Specific consideration was given to the Alltami Brook. Two route options were assessed to cross this watercourse and were presented during Statutory Consultation in Spring 2022. The route option named the North Alternative is located in an area of historic coal mining, which would present construction risks. The South Alternative is a shorter route and would result in reduced habitat loss compared to the North Alternative. The South Alternative is further from residential properties but would cross the watercourse in an area of steep terrain as well as potentially in an area of historic landfill (however, these factors may be mitigated). Due to the reduced impacts to residential and ecological receptors, the South Alternative was taken forward as the preferred option.

7.7.25. Alternative methods for the crossing of the Alltami Brook were subsequently considered and are reported within Chapter 4 of the ES **[REP4-031]**. In addition, a specific Alltami Brook Crossing Options Appraisal **[REP3-039]** was undertaken to further consider alternatives to reduce the potential impacts of the watercourse crossing. Consideration was given to the following in the Alltami Brook Crossing Options Appraisal **[REP3-039]**:

- Construction feasibility;
- Safety and integrity during operation;
- Eventual decommissioning;
- Land requirements; and

- Environmental impacts.

7.7.26. The trenched crossing option was identified as the preferred solution as it would avoid other safety and environmental risks associated with other options considered.

7.7.27. NRW have specifically raised with the Applicant the use of a steel truss bridge pipe bridge. This was considered in the Consideration of Alternatives in Chapter 4 of the ES **[REP4-031]**. This form of pipe-bridge is not acceptable to the Applicant outside of a secure site on health and safety grounds.

7.7.28. The reasons for rejecting this option are fully set out in the options report **[REP3-039]**. In summary, a exposed pipeline over crossings are known to attract trespassers with falls from height being a documented and significant hazard to members of the public. The Applicant assessed this option as having inherent safety risks not present in the trenched option and notes that this view is in line with UK Gas Network Operator best practice.

Minimise or cancel adverse impacts

7.7.29. Mitigation measures have been developed to minimise impacts to the Alltami Brook watercourse crossing during both construction and operation, which include reducing the overall working width, micro-siting to the least sensitive section of the streambed, high pressure grouting of any uncovered fractures within the bedrock to create an impermeable seal, and reinstatement of the channel bed. The proposed mitigation measures are summarised in Table 7-2 in the next section.

Mitigation measures assessment

7.7.30. Mitigation measures would be secured via a number of control documents within the Application including the following:

- OCEMP [REP4-237];
- Consideration of Alternatives **[REP4-031]**;
- Alltami Brook Crossing Options Appraisal **[REP3-039]**;
- REAC [REP4-235];
- WFD assessment **[REP4-174]**;
- Commitments in the Outline Landscape and Ecological Management Plan (OLEMP) **[APP-229 & APP-230]**; and
- Outline Surface Water Management and Monitoring Plan (Outline SWMMP) (document reference: **D.7.43**)

7.7.31. Furthermore, monitoring has been proposed where this links to the success of the implementation of the proposed mitigation measures. The monitoring would enable adaptive management should any of the mitigation require intervention in order to deliver the desired outcomes or effect repairs.

7.7.32. The monitoring of the Alltami Brook crossing includes adaptive management should there be any signs of failure of the impermeable seal at the crossing location or degradation of the concrete, grouting or reinstated materials (**D-WR-065** of the **REAC [REP4-235]**). Therefore, this mitigation measure would effectively manage the potential hypothetical worst-case risk of loss of water flow to ground within the Alltami Brook, and protect the Wepre Brook water body from deterioration.

7.7.33. The mitigation measures considered to ensure that all practicable steps were taken to mitigate the potential adverse impacts on the status of the Wepre Brook water body are provided in Table 7-2. The mitigation measures identified through the design and assessment process have been incorporated into the **REAC [REP4-235]**.

Table 7-2 – Mitigation Measures to Avoid, Reduce or Minimise Impacts to the WFD Water Body. (Level of Uncertainty Measures as L = Low, M = Medium, H = High)

Design	Construction	Operation	Decommissioning	Mitigation Measure	Description	Level of uncertainty of effectiveness of the mitigation measure	Is the mitigation measure technically feasible?	Would the mitigation measure be disproportionately costly?	Mitigation measure included?
X				Design route alignment and / or construction methods to avoid direct impacts to areas of classified Ancient Woodland (**D-BD-008** of the **REAC, [REP4-235]**)	To avoid loss of existing classified Ancient Woodland in England and Wales	L	Yes	No	Yes
X				Design route alignment to avoid high value habitats wherever possible. Where losses have been unavoidable, habitats that will not be permanently lost during construction are to be reinstated upon completion of the works (**D-BD-016, D-BD-048, D-BD-049, D-BD-053, D-BD-055, D-BD-062** of the **REAC [REP4-235]**)	To reduce permanent biodiversity loss	L	Yes	No	Yes
X				The principles of inherent safe design have been incorporated into the design of the pipeline as per relevant industry codes of practice and standards and the requirements of the Pipeline Safety Regulations 1996 (**D-CA-001** of the **REAC [REP4-235]**)	To avoid potential effects on sensitive environmental receptors	L	Yes	No	Yes
X				Micro-siting of the pipeline to be developed during detailed design to minimise potential environmental impacts as far as practicable (**D-BD-009** and **D-WR-050** of the **REAC [REP4-235]**)	Micro-siting to avoid, reduce and minimise potential adverse effects. This includes micro-siting of the Alltami Brook crossing following the collection of GI and borehole data.	L	Yes	No	Yes

Design	Construction	Operation	Decommissioning	Mitigation Measure	Description	Level of uncertainty of effectiveness of the mitigation measure	Is the mitigation measure technically feasible?	Would the mitigation measure be disproportionately costly?	Mitigation measure included?
	X			At the Alltami Brook, the working width for this open cut crossing would be reduced to 16m. Within this length of the watercourse there would be removal of riparian vegetation and temporary culverting of the watercourse. The maximum width of the trench would be 4m, which is the length of the watercourse which would have the permanent loss of bedrock riverbed (**D-WR-063** of the **REAC [REP4-235]**)	To reduce the effects on bedrock riverbed at Alltami Brook	L	Yes	No	Yes
	X			A pre-works crossing point survey will be carried out to record channel and bank morphology and features, riparian zone structure, and collect photographic record, so that reinstatement is as close to baseline as practicable. Re-instatement works should be supervised by an appropriately qualified ECoW (**D-WR-052** of the **REAC [REP4-235]**)	Detailed baseline data records to inform appropriate watercourse reinstatement to mimic baseline conditions	L	Yes	No	Yes
	X			High pressure grouting of any uncovered fractures within the excavated bedrock at the Alltami Brook crossing. Grouting would be applied to the base and walls of the excavation, plus the reinstatement of a bedrock capping over the concrete infill would be grouted to ensure an impermeable seal to prevent the potential loss of water to ground.	Creation of an impermeable seal at the Alltami Brook trenched crossing to prevent the loss of water	L	Yes	No	Yes
	X	X		The Outline Groundwater Management and Monitoring plan (document reference: **D.7.41**) sets out the monitoring requirements, establish a protocol for the assessment and response to monitoring data and provide methods to assess compliance with the conditions of development consents, environmental protection licences and legislation relating to groundwater and GWDTE (**D-WR-059** of the **REAC [REP4-235]**)	Monitoring plan for groundwater to assess groundwater levels to ensure no adverse effects	L	Yes	No	Yes

Design	Construction	Operation	Decommissioning	Mitigation Measure	Description	Level of uncertainty of effectiveness of the mitigation measure	Is the mitigation measure technically feasible?	Would the mitigation measure be disproportionately costly?	Mitigation measure included?
X	X			A bespoke geomorphology assessment will be carried out by the Construction Contractor to inform the micro-siting of the Alltami Brook crossing location and the detailed design of the permanent works to reinstate the watercourse after the pipeline is laid. This measure includes further consultation with NRW and the Lead Local Flood Authority (LLFA) (**D-WR-064** of the **REAC [REP4-235]**)	A detailed geomorphology assessment to further inform micro-siting of the pipeline and channel reinstatement to avoid, reduce and minimise potential adverse effects	L	Yes	No	Yes
		X		Geomorphological and ecological monitoring of the permanent works would be carried out post construction to ensure the integrity of the reinstated channel and to identify any early intervention that may be required to ensure no deterioration in WFD status. Type, duration and frequency of monitoring is to be determined through the development of the geomorphological assessment and detailed design, and in consultation with NRA and the LLFA (**D-WR-065** of the **REAC [REP4-235]**)	Operational monitoring to ensure no deterioration in WFD status of the Wepre Brook water body	L	Yes	No	Yes

TEST B) THE REASONS FOR THE MODIFICATIONS OR ALTERATIONS ARE SPECIFICALLY SET OUT AND EXPLAINED IN THE RBMP

7.7.34. Test (b) requires that where modifications to a water body require derogation, that the reasons for those modifications and alterations are specifically set out and explained in the RBMP and that the objectives are reviewed every six years.

7.7.35. The modifications to the Wepre Brook WFD water body would be capable of being reported within the next round of the Dee RBMP based upon the evidence presented within this derogation case. The case for derogation has been specifically requested by NRW during consultation with them and in their Relevant Representations **[REP1-071]**.

TEST C)(I) THERE IS AN OVERRIDING PUBLIC INTEREST IN THE PROPOSED DEVELOPMENT AND/OR (II) ITS BENEFITS OUTWEIGH THE BENEFITS OF THE WFD OBJECTIVES

- Only one part of Test c needs to be met to meet the Article 4(7) tests, however both tests may also be met.

Test c(i) overriding public interest

7.7.36. The first part of this test has been used to demonstrate that the DCO Proposed Development meets the requirements of Test c(i). Evidence has been provided within the Application in relation to the contribution of the DCO Proposed Development to the policies listed below and in particular to the Net-Zero Strategy and the Energy Security Strategy.

7.7.37. The Planning Statement **[REP4-022]** assesses how the DCO Proposed Development is compliant with the legislative and consenting frameworks of relevance and importance.

7.7.38. The DCO Proposed Development aligns with the following key policies in relation to overriding public interest:

- Net Zero Strategy (**Ref. 1-13**);
- Energy Security Strategy (**Ref. 1-14**);
- Energy Wales: A Low Carbon Transition (2012) (**Ref. 1-15**);
- Clean Growth Strategy (**Ref. 1-16**);
- Overarching National Policy Statement for Energy EN-1 (NPS-EN1) (**Ref. 1-17**);
- Well Being and Future Generations (Wales) Act 2015 (**Ref. 1-18**);
- Energy White Paper – Powering Our Net Zero Future (**Ref. 1-19**);
- Industrial Decarbonisation Strategy (**Ref. 1-20**);

- UK Hydrogen Strategy (**Ref. 1-21**);
- White Paper – Levelling Up The United Kingdom (**Ref. 1-22**);
- British Energy Security Strategy (**Ref. 1-23**);
- Prosperity For All: A Low Carbon Wales (**Ref. 1-24**);
- A Carbon Capture, Utilisation and Storage Network for Wales (**Ref. 1-25**);
- Net Zero Wales (Carbon Budget) (**Ref. 1-26**); and
- Wales Infrastructure Investment Strategy (**Ref. 1-27**).

7.7.39. National Policy Statement for Energy (NPS EN-1) (**Ref. 1-17**) makes clear that the Governments key objectives in energy policy are to ensure energy security for the UK and to decarbonise energy capacity in order to meet the UK's 2050 climate change targets. It explicitly identifies the urgent need for new (and in particular low carbon) Nationally Significant Infrastructure Projects (NSIPs) in the UK within the next 10-15 years. NPS EN-1 (**Ref. 1-17**) does not specifically reference or provide guidance for Carbon Capture and Storage (CCS) for hydrogen production or industrial de-carbonisation solutions within the UK. It is however considered a useful policy reference document that includes over-arching principles that support decarbonisation and diversity of energy supply, that the DCO Proposed Development seeks to achieve.

7.7.40. Draft revised NPSs for energy infrastructure were published by the UK Government for consultation in September 2021. The Draft NPS EN-1 now reflects this broader use case for the technology, the Government's commitment to design new business models for hydrogen supporting transport and storage infrastructure by 2025 is also re-iterated in draft EN-1. The drafts set out the "urgent need" for new CCS infrastructure, understanding the role of new CO_2 pipelines in expanding CCS networks.

7.7.41. The Needs Case for the DCO Proposed Development **[APP-049]** outlines the needs in the context of the Government's objectives for a more resilient energy network and greenhouse gas emission reductions.

7.7.42. There is clear evidence that climate change is underway and urgent action is needed. The Intergovernmental Panel on Climate Change (**Ref. 1-28**) has stated that global warming is "unequivocal", and it is "extremely likely" that human activity has been the "dominant cause" of the rising temperatures witnessed during the 20th century. Rapid and unprecedented shifts are required across all aspects of society to avoid catastrophic climate change.

7.7.43. The Climate Change Act 2008 (as amended) ('the Act') (**Ref. 1-29**) is the primary legislative driver to deliver the UK's response to climate change. The Act put an obligation on the UK Government to set a carbon budget (maximum level of the net UK carbon account) which covers a five-year period and is released 11 years prior to coming into force. It is set in parallel with an impact assessment on businesses and the voluntary sector.

7.7.44. The UK's sixth (and latest) carbon budget was set in 2021 and covers the period 2033-2037. It sets the carbon budget at 965 $MtCO_2e$ or 965,000,000 tonnes of CO_2 equivalent. This represents a 78% reduction in emissions on 1990 levels and is 760,000,000 tonnes lower than the fifth carbon budget (**Ref. 1-13**).

7.7.45. The Welsh Government released their Carbon Budget 2 in October 2021, which covers the years 2021-2025 and sets out proposals on how it will be met. The document recognises the DCO Proposed Development will provide an opportunity for businesses in North Wales to decarbonise industrial processes.

7.7.46. The Committee on Climate Change (CCC) has stated that CCS is a necessity, not an option (**Ref. 1-30**). CCS is fundamental to the decarbonisation of energy intensive industries, such as refineries, chemical and cement plants, and will enable domestic production of low carbon hydrogen from natural gas.

7.7.47. Through proposed updates to National Policy Statement (NPS) EN-1 (**Ref. 1-17**), the UK Government recognises that new CCS infrastructure will be essential to ensuring the transition to a Net-Zero economy and that any realistic alternatives to new CCS infrastructure for delivering Net-Zero by 2050 are limited.

7.7.48. As presented in Chapter 2 of the ES **[REP4-028]**, the Application is an innovative low carbon and hydrogen energy project that will unlock a low carbon economy for the North West of England and North Wales and put the region at the forefront of the UK's drive to Net-Zero. The importance of the project has been recognised in the Government's choice in taking forward the project in Track-1 of its Cluster Sequencing process (**Ref. 1-31**).

7.7.49. This Project will be key to meet the ambitious but critical targets set by The Climate Change Act 2008 (as amended) (**Ref. 1-29**) and sets the way forward for other industrial clusters in the UK and abroad to decarbonise industry and the economy.

7.7.50. The North West of England and North Wales are perfectly set up to deliver a low cost and low risk CCS and low carbon hydrogen project. The North West industrial cluster is located close to ideal geological structures for both the permanent offshore storage of CO_2 in storage reservoirs beneath Liverpool Bay, and the onshore storage of low carbon hydrogen in salt caverns in Cheshire. The natural gas reservoirs in Liverpool Bay continue to produce but will reach the end of their production life ahead of re-purposing for CO2 storage to begin in the mid-2020s.

7.7.51. As an integral part of the project, the DCO Proposed Development will transport CO_2 captured from greenhouse gas emitting industries in the region and from the new low-carbon hydrogen plant, contributing to the reduction of CO_2 in the atmosphere and making a significant contribution to the international, national and local effort against the climate emergency. The project has the potential to capture 10 $MtCO_2$ per year by the early 2030s, the equivalent of taking 4 million cars off the road or the equivalent of heating 5 million households with natural gas boilers.

7.7.52. Key Welsh legislation and policy relevant to meeting the requirements of Article 4(7) Test c(i) are listed above. One of the Welsh Government's Wellbeing objectives is to "build a stronger, greener economy as we make maximum progress towards decarbonisation", and with regard to Climate Change, Welsh Government has a commitment to "support innovation in new renewable energy technology". The Applicant does not consider that any part of its proposal conflicts with the Well Being and Future Generations (Wales) Act, but rather the DCO sought would positively contribute to advancing the well-being goals by (inter alia) contributing to progress towards net zero.

7.7.53. It is noted that the statutory well-being guidance Shared Purpose: Shared Future Statutory guidance on the Well-being of Future Generations (Wales) Act 2015 issued under sections 14, 22(2) and 51(1) of the Well-being of Future Generations (Wales) Act 2015, Welsh Government, February 2016) provides that the well-being objectives must be considered as an integrated set and "the fundamental relationship between improving the economic, social, environmental and cultural well-being of Wales" must be recognised (paragraph 112). It sets out the importance ascribed to taking an integrated view and not focusing on single factors at the expense of wider considerations:

- 75. There may have been some weaknesses in how organisations have failed to take an integrated approach to date which can result in:
- Silo working – focusing on specific issues without awareness of their connections with other issues. …

- Looking at impacts separately and at different times (in particular when carrying out impact assessments)

7.7.54. In April 2019, the Welsh Government declared a Climate Emergency in Wales with the intention of prompting a wave of action at home and internationally. This includes reducing emissions.

7.7.55. It is also pertinent to note that the Transport and Storage (T&S) infrastructure, of which the DCO proposed development is part, is critical to delivering the HyNet North West Project's low carbon Hydrogen schemes, therefore there is wider overriding public interest in the successful implementation of the DCO Proposed Development.

7.7.56. The DCO Proposed Development aligns with the following key planning policy legislation in relation to overriding public interest:

National

- Adopted National Policy Statement (EN-1 (Ref. 1-17) & EN-4 (**Ref. 1-32**);
- Draft National Policy Statement (EN-1 (**Ref. 1-17**) & EN-4 (**Ref. 1-32**);
- National Planning Policy Framework (**Ref. 1-33**);
- Future Wales: The National Plan 2040 (**Ref. 1-34**); and
- Planning Policy Wales & Technical Advice Notes (**Ref. 1-35**).

Local

- Cheshire West and Chester Local Plan (Part 1) Strategic Policies (Adopted 2015) (Ref. 1-36);
- Cheshire West and Chester Local Plan (Part 2) Land Allocations and Detailed Policies (Adopted 2019) (Ref. 1-37); and
- The Flintshire Local Development Plan (LDP) (Adopted 2023) (Ref. 1-38).

7.7.57. Annex B of the Planning Statement **[REP4-022]** includes a compliance assessment against the relevant policies contained within these national and local legislative frameworks.

7.7.58. Nearly 70% of local authorities in England and Wales declared a climate emergency with many setting Net-Zero goals earlier than the national 2050 target. Cheshire West and Chester Council (CWCC) unanimously declared a climate emergency on 21 May 2019. The Council is targeting "the earliest date before 2045" to become Net-Zero. Flintshire county Council (FCC) has set the target date of 2030 to decarbonise council operations and promote the protection and enhancement of the county's natural environment.

7.7.59. This demonstrates that CWCC, FCC and Welsh Government all recognise the climate emergency and the importance of achieving Net-Zero carbon emissions. All are striving to reach Net-Zero ahead of the UK target of 2050 and the Project, including and enabled by the DCO Proposed Development, will play a key role in supporting these ambitions across England and Wales.

7.7.60. The DCO Proposed Development will deliver industrial decarbonisation to meet this goal of a low carbon energy system and the subsequent greater commitment to achieve net zero by 2050.

7.7.61. The DCO Proposed Development enables the operation of the wider HyNet Project. The transportation of CO_2 through the new and repurposed existing pipeline means that industry in the region will be able to reduce their emissions and a new low carbon hydrogen plant can be built with the majority of CO_2 captured. Without the CO_2 pipeline, the wider Project cannot be realised.

7.7.62. Given the contribution of the DCO Proposed Development towards the policies listed and discussed above, the Applicant concludes the conditions within Test c(i) have been met.

Test c(ii) benefits outweigh the benefits of the WFD objectives

7.7.63. The assessment of benefits comparison is split into three stages:

- Stage 1: Summarise the benefits foregone resulting from failing to achieve the environmental objectives of the WFD. Impacts to ecosystem services may provide a useful framework to establish benefits foregone.
- Stage 2: Summarise the benefits of the project or activity in terms of human health, human safety and / or sustainable development.
- Stage 3: Use a weight of evidence approach to weigh up the benefits vs the benefits foregone - using the information gathered in Stages 1 and 2.

7.7.64. For the Stage 1 assessment, the risk of failing to achieve the environmental objectives of the WFD due to the proposed trenched crossing of the Alltami Brook is low. The risk of loss of water to the watercourse as a result of the trenched crossing has been raised as a hypothetical worst-case scenario by NRW. Evidence presented by the Applicant within the HIA (document reference: **D.7.36**) indicates no viable pathways for there to be a significant loss of water due to the proposed activity. Based on the evidence compiled, the hydraulic gradient is upwards from the bedrock aquifers to the Alltami Brook under normal conditions. Additionally, the nearby historic abandoned coal mines do not represent likely recipient of flow given mine water levels have most likely recovered or reached equilibrium since abandonment in the late 1940s. This is also due to the known laterally discontinuous fracture flow conditions and distance to the mine workings. The HIA has demonstrated that there is no clear mechanism present which would allow for significant flow loss from the Alltami Brook to occur.

7.7.65. In addition, the Applicant would also implement mitigation measures to ensure an impermeable seal is created by the use of high pressure grouting within the excavated trench and reinstatement of the channel bed to ensure no loss of water to ground could occur. The use of high pressure grouting to fill any fractures within the bedrock following excavations follows best practice industry standards (e.g. BS EN 12715:2020) and this technique is widely used and implemented successfully on other Nationally Significant Infrastructure Projects and other major infrastructure schemes including the Thames Tideway Tunnel, Lee Tunnel and the Wimbleball Dam.

7.7.66. Furthermore, the commitment to monitoring of the condition of the reinstated channel bed would identify any potential future failure of the grouted impermeable seal and repairs would be implemented. These measures, coupled with evidence pointing towards an upward hydraulic gradient within the Alltami Brook, mean that no significant loss of water is anticipated and therefore no deterioration to WFD water body status is expected. Consequently, the Applicant does not consider that the DCO Proposed Development would result in a failure to achieve the environmental objectives of the WFD.

7.7.67. Therefore, it is concluded that the risk is of low significance given the hydrogeological evidence presented coupled with the implementation of the proposed mitigation measures.

7.7.68. For the Stage 2 assessment, a summary of the benefits of the project or activity needs to be demonstrated against one or more of the following:

- Human health

- Maintenance of human safety
- Sustainable development

7.7.69. Specific factors also considered include those with direct and indirect effects. The Stage 2 benefits assessment is provided in Table 7.3.

Table 7.3 – Stage 2 Benefits and Significance Assessment (Adapted from NRW OGN077)

Category	Benefits Assessment	Significance Assessment
Human health	The Alltami Brook crossing location has a Public Right of Way (PRoW) 39A and is widely used for recreational purposes. The below ground infrastructure, as proposed with the trenched crossing, would not impact upon recreational use or landscape and visual amenity.	Moderate significance
Human safety	Below ground infrastructure, such as the use of a trenched crossing of the Alltami Brook, offers inherent safety advantages.	High significance
Sustainable development	Carbon capture scheme – this aligns with policies set out in Test c(i) above and aligns with climate change adaptation. The trenched crossing as opposed to the alternative next-best (but not significantly better environmental) solution reduces the use of concrete in the construction of the proposed crossing of the Alltami Brook and therefore has a lower carbon impact. Other environmental considerations include the low risk of deterioration due to the hypothetical worst-case scenario postulated by NRW, coupled with the evidence presented by the Applicant indicating no obvious pathways for there to be a loss of stream flows plus the monitoring and adaptive management	Very high significance

Category	Benefits Assessment	Significance Assessment
	should the impermeable seal require repairs in the future.	

7.7.70. Stage 3 weighs up the benefits versus the benefits foregone using the information gathered in Stages 1 and 2 above. The benefits assessment concludes that the benefits of the trenched crossing of the Alltami Brook outweigh the potential benefits foregone. This is due to the evidence indicating that the risk of deterioration in WFD status due to potential water loss and pathways for water contamination are highly unlikely. This is due to data indicating there is an upwards hydraulic gradient operating within the Alltami Brook catchment, therefore, there is no pathway for potential water loss to ground. In addition, the proposed mitigation measures would infill any exposed fractures in the base and walls of the excavation required to lay the pipeline with high pressure grouting techniques (to BSI Standards) to create an impermeable seal to prevent water loss. A commitment to monitoring would ensure the integrity of the mitigation measures employed (**D-WR-065** of the **REAC [REP4-235]**).

TEST D) THE BENEFITS OF THE PROJECT CANNOT BE ACHIEVED BY A SIGNIFICANTLY BETTER ENVIRONMENTAL OPTION

7.7.71. Alternative options in terms of pipeline route corridors and route alignments have been presented under Test (a).

7.7.72. A specific assessment of watercourse crossing options was undertaken for the Alltami Brook in order to determine whether there is a significantly better environmental option. Details of this options appraisal are provided within the Alltami Brook Crossing Options Appraisal report **[REP3-039]** and a summary of the outcomes are provided below.

7.7.73. The Newbuild Carbon Dioxide Pipeline will be built out of steel and designed to British Standards (BS) PD8010-1 Pipeline Systems. In accordance with PD8010-1, the project design philosophy is to bury the pipeline and to avoid the use of above-ground crossings (as per clause 6.9.4 of PD8010-1).

7.7.74. The preferred method to bury the Newbuild Carbon Dioxide Pipeline is through trenched installation. Where this cannot be achieved, the use of trenchless crossing techniques is utilised instead.

7.7.75. The key constraints to pipeline construction for the crossing of the Alltami Brook are as follows:

- The Alltami Brook and gorge comprises a mixture of habitats including established mature woodland, scrub, and grassland, as well as riparian and aquatic habitats. The area is also encompassed by the Brook Park Farm Wood Wildlife Site, a local nature reserve. The Deeside and Buckley Newt Special Area of Conservation (SAC) is located to the north. Woodland present within the Order Limits has been considered Annex I habitat given its contiguous nature and likely historic connection to the SAC designated woodland.
- To the south of the crossing, the gorge is steep sided, with areas of local shallow land slippage. This steep profile is made of artificial fill displaced during the construction of the A55. There are areas of historic coal mining located in the field directly adjacent to the brook, including adits and shafts. Further information on the historic mine records are provided in the Alltami Brook Crossing Options Appraisal report **[REP3-039]**.
- To the west of the crossing area (upstream), the brook is routed through a culvert under the A55 dual carriageway. The A55 is elevated on a steep embankment. There is a 33kV overhead powerline that crosses the brook adjacent to the A55 culvert.
- To the north of the crossing, the gorge side is less steep, but is predominantly wooded. An old mine track is known to have passed alongside the brook and is now a public footpath.

7.7.76. The following methods have been considered for the pipeline crossing of the Alltami Brook and are discussed in detail within the Alltami Brook Crossing Options Appraisal report **[REP3-039]**:

- Trenched Crossing;
- Trenchless Crossing – Horizontal Directional Drilling (HDD);
- Trenchless Crossing – Micro-Tunnelling;
- Over Crossing – Steel Truss Bridge; and
- Over Crossing – Embedded Pipe Bridge.

7.7.77. To fulfil Test (d) of Article 4(7), there must be no significantly better environmental option for achieving the benefits expected as a result of the project or activity, or, if there is such an option, it is ruled out on the grounds of either technical infeasibility and or it is disproportionately costly.

7.7.78. A summary of the options comparison to determine whether there is a significantly better environmental option is presented in Table 7.4. Further detail on these options is provided within the Alltami Brook Crossing Options Appraisal **[REP3-039]**.

Table 7.4 – Assessment of Alternative Options to Determine whether there is a Significantly Better Environmental Option

Option	Trenched crossing	Horizontal Directional Drilling	Micro-tunnelling	Steel Truss Bridge	Embedded Pipe bridge
Key Constraints	Ground works would be required on the south bank including slope stabilisation, creating a haul route or working platform on the artificial fill layer within the hillslope. Working corridor required through the trees on the north slope; no slope stabilisation is anticipated. Temporary land take to secure a working area and access. Temporary diversion of PRoW 39A. Exclusion of cattle from the temporary land take area.	Temporary land take to secure a working area and access, including the creation of entry and exit pits for the HDD. A larger land take area would be required compared to the trenched technique. There is the risk of encountering unmapped mine workings at depth. The potential loss of drill fluid into mine workings may result in failure of the crossing installation and poses secondary contamination risks should this create a new pathway for mine water to enter watercourses. These are considered major risks. Temporary diversion of PRoW 39A. Exclusion of cattle from the temporary land take area.	The current lack of GI data at this location presents significant uncertainty due to potential fault locations, rock strength, depth of coal measures and presence of ground gas and groundwater. These would need to be confirmed. These factors may also affect the drive diameter of the launch and reception shafts. To the south side, the shaft would need to be sited a sufficient distance to avoid the infill material from the A55 construction and the unstable ground conditions. The shaft location would also need to consider the risks of encountering historical mining works. Micro-tunnelling would face similar risks of encountering mine works to those associated with HDD, although on a smaller scale given that micro-tunnelling has no reliance on mud pressure to stabilise the anulus. Temporary land take would be required to create a secure working area, create the shafts and provide access. A larger land take would be required compared to a trenched crossing. Temporary diversion of PRoW 39A. Exclusion of cattle from the temporary land take area.	This option would be supported by large concrete piers on either side of the Alltami Brook and would span the watercourse to avoid impacts to the water body. This option presents a departure from the buried pipeline philosophy for the DCO Proposed Development. Temporary land take to secure a working area and access. Temporary diversion of PRoW 39A. Exclusion of cattle from the temporary land take area. Permanent land take would be required for the bridge supports and any ancillary elements, such as fencing to prevent trespass. The current use of this area would be extinguished. The PRoW would require a permanent diversion onto a new alignment around the steel truss bridge supports. A suitable gradient would be required for the PRoW, which may necessitate ground works.	This option comprises a concrete bridge structure spanning the Alltami Brook with the Newbuild Carbon Dioxide Pipeline encased within the bridge. This option presents a departure from the buried pipeline philosophy for the DCO Proposed Development. Re-profiling of the hillslope on the southern side may be required to reduce the approach angle down to the bridge structure. The structure is designed not to interfere with the stream bed or banks Temporary land take to secure a working area and access. Significant ground works would be required for crane pads and access on both sides of the Alltami Brook. Cranes would be required to lift the bridge sections into place from the slopes of the gorge. Piling mats may also be required should the abutments need piling. Exclusion of cattle from the temporary land take area. Permanent land take would be required for the bridge supports and any ancillary elements, such as fencing to prevent trespass. The current use of this area would be extinguished. The PRoW would require a permanent diversion onto a new

Option	Trenched crossing	Horizontal Directional Drilling	Micro-tunnelling	Steel Truss Bridge	Embedded Pipe bridge
					alignment around the embedded pipe bridge supports. A suitable gradient would be required for the PRoW, which may necessitate ground works.
Technical Feasibility	Weakened Sandstone bedrock makes this installation technique viable. High pressure grouting of any uncovered fractures within the excavation would create an impermeable seal, thus preventing the potential loss of water flow. This would be to BS EN 12715:2020.	HDD installation is limited by the elastic bend radius of the Newbuild Carbon Dioxide Pipeline, which is a nominally 1100m radius of curvature. The deep valley setting poses an additional technical challenge to achieving this crossing. A HDD profile of at least 450m would be required to achieve the crossing, but this length could be increased due to geological conditions. HDD through rock increases the risk of damage to the pipeline's protective coating during installation. Also. the presence of coal at shallow depths may decrease the efficiency of the cathodic protection system due to its high carbon content and highly conductive nature. These factors pose a significant risk to the installation and with no practical means of maintenance and repair, which may reduce the operational lifespan of the pipeline. The potential loss of drill fluid during installation may result in a failed crossing.	Micro-tunnelling would be challenging due to the depth of the gorge. Impractical depth of the launch and reception shafts. The vertical entrance and exit shafts would need to be excavated through bedrock to a minimum depth of at least 25m with an approximate diameter of 8.2m. Drilling a shaft of such a diameter into rock is possible but is a highly specialised activity and is likely to take a number of months.	This crossing option enables cathodic protection continuity but would require periodic inspection and maintenance of the pipeline coating and structural supports.	This crossing option enables cathodic protection continuity and would require less frequent inspection of the coating and structural supports. The Newbuild Carbon Dioxide Pipeline embedded within the bridge structure would be physically protected including protection from corrosion in the same manner as the remainder of the pipeline. No additional inspection efforts would be required for the pipeline.
Disproportionate Costs	Comparatively low-cost installation compared to other options.	Considerably higher cost technique compared to a trenched crossing	The micro-tunnelling will involve the movement and storage of a considerable volume of excavated	Higher cost option compared to the trenched crossing.	Higher cost option compared to the trenched crossing.

Option	Trenched crossing	Horizontal Directional Drilling	Micro-tunnelling	Steel Truss Bridge	Embedded Pipe bridge
		including longer programme to execute the works. Potential for a failed installation would be costly.	material, which would be disproportionately costly compared to other viable options.		
Environmental Impacts	Micro-siting of the pipeline will be developed during detailed design to further avoid and / or reduce potential environmental impacts. Removal of riparian zone for the enabling works. During construction, continuity of flow would be maintained by either a flume pipe across the trench to be excavated or by installing a temporary dam and over-pumping the water, or a combination of these methods. Excavation of the stream bed will be limited to a 4m long section of the brook and the working with restricted to 16m within the riparian zone. Reinstatement of the stream bed with grouting to seal fractures and provide an impermeable seal, infill with concrete and reinstatement of the stream bed surface with a bedrock and boulder dressing to mimic baseline. Therefore, no alteration to flow velocity, flow patterns of physical habitat is anticipated. The HIA indicates an upward hydraulic gradient and therefore no pathway for the loss of water flows. Localised and temporary impacts anticipated during the construction	During installation, the risk of breakout of drill fluid into surrounding fractured bedrock aquifer and rising through the bedrock into the watercourse or passing through fractures into mine workings and into the watercourse could result in pollution of either or both surface water and groundwater, with potential impacts to biological and physico-chemical WFD quality elements. These impacts would be temporary in nature but ecological recovery could result in a slower recovery time, depending upon the extent of any potential pollution incident. HDD method is unlikely to require the removal of riparian vegetation.	During installation, the risk of breakout of drill fluid from aperture into surrounding fractured bedrock aquifer and rising through the bedrock into the watercourse or passing through fractures into mine workings and into the watercourse could result in pollution of either or both surface water and groundwater, with potential impacts to biological and physico-chemical WFD quality elements. These impacts would be temporary in nature but ecological recovery could result in a slower recovery time, depending upon the extent of any potential pollution incident. This option requires a large temporary land take to enable the excavation of the vertical entrance and exit shafts. Micro-tunnelling method is unlikely to require the removal of riparian vegetation.	Potential construction impacts to the water environment and WFD status would localise and temporary in nature and would be managed through the OCEMP **[REP4-237]**. Vegetation removal, including riparian vegetation, would be required as part of the enabling works for both the construction and decommissioning phases. During operation, there would a localised loss of riparian habitat in the vicinity of the steel truss bridge. However, this would be off-set by the proposed riparian planting within the Alltami habitat mitigation area. Decommissioning would require the partial removal of the reinstated habitat mitigation area to the enabling works. The vegetation would be reinstated post-decommissioning but would take a number of years to return to providing the same degree of functional habitat.	Potential construction impacts to the water environment and WFD status would localise and temporary in nature and would be managed through the OCEMP **[REP4-237]**. Vegetation removal, including riparian vegetation, would be required as part of the enabling works for both the construction and decommissioning phases. During operation, there would a localised loss of riparian habitat in the vicinity of the embedded pipe bridge. However, this would be off-set by the proposed riparian planting within the Alltami habitat mitigation area. The decommissioning phase, if required, would have the largest environmental impact of the options considered due to vegetation clearance, land take and decommissioning activities required. This option would require the removal of an area of habitat mitigation implemented at the Alltami Brook location to off-set the DCO Proposed Development.

Option	Trenched crossing	Horizontal Directional Drilling	Micro-tunnelling	Steel Truss Bridge	Embedded Pipe bridge
	phase and managed through the OCEMP **[REP4-237]**. Localised operational impacts to the riparian zone due to the root exclusion zone. However, this will be offset with riparian planting within the Alltami Brook habitat mitigation area **[APP-299 & APP-230]**.				
Decommissioning	Low impact given it is best practice is to leave buried pipelines in situ. The pipeline would be grouted to ensure stability beneath the watercourse. This would avoid disturbance to the habitat mitigation area at Alltami Brook, including riparian vegetation and minimise impacts to landowners.	It would not be practicable to remove the pipeline using this technique. Therefore, low impact as the pipeline would be left in situ and grouted for stability.	It would not be practicable to remove the pipeline using this technique. Therefore, low impact as the pipeline would be left in situ and grouted for stability.	The steel truss bridge structure would be removed at the end of the operational life. The decommissioning would have similar environmental impacts to the construction phase. Therefore, impacts to the WFD water body during decommissioning would be temporary only and managed through the DEMP. The decommissioning of the steel truss bridge would require vegetation clearance, including the removal of riparian vegetation and disturbance to the habitat mitigation area at the Alltami Brook location. This habitat would be well developed following a period of 25-30 years of establishment. This would pose a temporary degradation to the riparian zone along the Alltami Brook. Vegetation would be reinstated post decommissioning. There would be no mechanism to return the diverted PRoW to its original route post-decommissioning, therefore it	The removal of the embedded pipe bridge, if required, would necessitate significant effort, similar to that of construction. The associated environmental impacts would therefore be high compared to the other options and necessitate the removal of a large area of the habitat mitigation zone to enable crane access to the site. Vegetation would be reinstated post decommissioning but would take time to establish and provide the habitat value to wildlife. There would be no mechanism to return the diverted PRoW to its original route post-decommissioning, therefore it would remain on the diverted route. Leaving the PRoW diversion operational would reduce potential environmental impacts relating to vegetation removal and fine sediment and pollution risk to the watercourse.

Option	Trenched crossing	Horizontal Directional Drilling	Micro-tunnelling	Steel Truss Bridge	Embedded Pipe bridge
				would remain on the diverted route. Leaving the PRoW diversion operational would reduce potential environmental impacts relating to vegetation removal and fine sediment and pollution risk to the watercourse.	
Outcome	Once installed, the pipeline would be 'invisible' and land take limited to the subsurface acquisition with restrictions on surface use to protect the pipeline. Landowners would resume land use practices. PRoW would be reinstated on its current route. No additional maintenance activities compared to other trenched crossings. Regular monitoring of the Alltami Brook would be required to assess any water body impacts. This would include any required adaptive management to ensure both no loss of water flow and for WFD compliance. Overall, no impacts are anticipated at the WFD water body scale with the proposed mitigation measures in place and therefore no deterioration is anticipated as a result of the trenched crossing. No cumulative impacts are anticipated within the Wepre Brook water body due to the temporary	Once installed, the pipeline would be 'invisible' and land take limited to the subsurface acquisition with restrictions on surface use to protect the pipeline. Landowners would resume land use practices. PRoW would be reinstated on its current route. Due to the risk of coating damage during installation and impaired cathodic protection effectiveness, it may be necessary to increase the frequency of in-line inspection to monitor pipeline integrity. During such inspections, the pipeline CO_2 throughput may have to be reduced, potentially causing either shut-down, restricted operations or emission of CO_2 to atmosphere at emitter facilities using the pipeline.	Once installed, the pipeline would be 'invisible' and land take limited to the subsurface acquisition with restrictions on surface use to protect the pipeline. Landowners would resume land use practices. PRoW would be reinstated on its current route.	This option would be the only section of exposed pipeline along the DCO Proposed Development. The exposed section of Newbuild Carbon Dioxide Pipeline would also be more susceptible to corrosion mechanisms and would require dedicated maintenance checks to verify the integrity of the anti-corrosion coatings of both the Newbuild Carbon Dioxide Pipeline and the support structure. Deterioration of the coatings would require the need to repaint over the design life of the project, requiring both working at height and working over water, both of which are avoidable by alternative watercourse crossing options. The exposed Newbuild Carbon Dioxide Pipeline would be more susceptible to accidental and / or targeted damage. Industry experience provides evidence that members of the public do trespass onto exposed pipelines at considerable risk to their own safety.	This option avoids impacting the Alltami Brook during construction. The design also offers protection to the Newbuild Carbon Dioxide Pipeline throughout its operating life and minimises safety risks, compared to the steel truss bridge option. With the pipeline encased within the concrete structure, the Newbuild Carbon Dioxide Pipeline is protected from external corrosion mechanisms, third party damage and vandalism. This solution also avoids any transitions between a buried and an exposed pipeline, where additional protection measures may be required to protect the pipeline from damage. The Newbuild Carbon Dioxide Pipeline approaches on either side of the Alltami Brook would be buried by trenched installation. The concrete bridge would be supported by large concrete piers on either side of the brook. The clearance over the brook would be designed to avoid any increase in local flood risks. The bridge would be constructed out of pre-cast

Option	Trenched crossing	Horizontal Directional Drilling	Micro-tunnelling	Steel Truss Bridge	Embedded Pipe bridge
	construction impacts within the Wepre Brook watercourse.			Measures would be implemented to prevent access by unauthorised persons, but there would remain the risk both to the safety of persons accessing the pipeline and to the pipeline itself from such access, such as people climbing onto the pipeline. Even with safety measures in place, the safety risk of a steel truss bridge crossing of the Alltami Brook would be considered High due to the proximity of the PRoW.	bridge beams and retaining walls. The Newbuild Carbon Dioxide Pipeline would be installed within and buried with bedding sand or soil.
	Preferred option.	Discounted due to technical feasibility.	Discounted due to technical feasibility and disproportionate costs.	Discounted due to the embedded pipebridge option designing out the adverse risks associated with this option.	Alternative option but not a significantly better environmental option due to construction and decommissioning phase impacts.

7.7.79. The assessment of options concluded that the trenched crossing of the Alltami Brook offers the best environmental and engineering option for the watercourse crossing.

7.7.80. An alternative option lies with the embedded pipe bridge. However, this design is not considered to be a significantly better environmental option. This is due to the construction and decommissioning phase activities being the most environmentally impactful and requiring the largest land take of all the options considered, including the need for crane pads for lifting the pipe bridge sections into place and their subsequent removal at the end of its operational life.

7.7.81. The large land take for decommissioning of the structure will also necessitate the removal of part the habitat mitigation area, which would be well-established by the time of decommissioning. The environmental impacts of the construction and decommissioning phases are therefore regarded as disproportionate and do not offer a significantly better environmental option.

7.7.82. The HDD method has been discounted on the ground of technical feasibility, as described in Table 7.4.

7.7.83. The micro-tunnelling option has been discounted on grounds of both technical infeasibility and disproportionate costs, as described in Table 7.4.

7.7.84. The steel truss bridge option has been discounted due to the inherent safety risks associated with such bridge structures. In addition, an exposed section of pipeline would require periodic inspection and maintenance to protect from corrosion of both the pipeline and the steel truss supports. These risks were effectively designed out with the embedded pipe bridge option.

7.8. ARTICLES 4(8) AND 4(9)

7.8.1. With regards to Article 4(8) of the WFD legislation, the proposed trenched crossing of the Alltami Brook is not anticipated to impact downstream water bodies and therefore will not prevent the achievement of environmental objectives set for downstream water bodies.

7.8.2. Even in the event of the hypothetical worst-case scenario of water loss within the Alltami Brook, downstream water bodies would not be prevented in the achievement of their environmental objectives due to the size and volume of water within the downstream water bodies.

7.8.3. There are no water bodies upstream of the Alltami Brook and therefore potential impacts to upstream water bodies does not require assessment.

7.8.4. With regards to Article 4(9) of the WFD legislation, the proposed trenched crossing of the Alltami Brook will not impact upon Protected Areas and the level of protection provided, again due to the localised potential impacts which are not anticipated to have effect beyond the Wepre Brook WFD water body.

8. SUMMARY AND CONCLUSIONS

8.1.1. The Applicant has presented a robust evidence case under the Applicability Assessment and the Article 4(7) tests for derogation which demonstrates that, should derogation be required, it should be granted.

8.1.2. The Applicant has provided evidence to demonstrate that all practical steps were taken in the selection of the Newbuild Carbon Dioxide Pipeline corridor and route options assessment to mitigate adverse impacts to the environment and at the WFD water body scale. This included a route corridor selection to mitigate adverse impacts to the Dee Estuary SAC. A specific route options assessment was also undertaken at the Alltami Brook crossing and Wepre Brook water body to further mitigate potential adverse effects.

8.1.3. Given the nature of the DCO Proposed Development and the legislation and considerable policy support for carbon capture and storage as an important part of the strategy to reach Net Zero, there is a clear case that there is an overriding public interest in allowing the DCO Proposed Development to proceed.

8.1.4. The HIA concludes that the evidence indicates an upwards hydraulic gradient within the Alltami Brook watercourse. Consequently, there is no viable pathway for the potential loss of water flow from Alltami Brook to ground. In addition, construction mitigation includes the grouting of any uncovered fractures within the excavated bedrock for the trenched pipeline crossing using high-pressure grouting, which is impermeable. This impermeable seal would also prevent the potential risk of flow pathways for contaminants from historic mining.

8.1.5. The Applicant considers that it is very unlikely there will be a deterioration in WFD status as a result of the trenched crossing. However, where the ExA and SoS are not satisfied that this conclusion is correct, the Applicant submits that derogation should be granted for the trenched crossing. The case for such derogation set out in this document demonstrates that the benefits outweigh the potential for the postulated worst-case scenario for the potential loss of water flow.

8.1.6. The Alltami Brook Crossing Options Appraisal **[REP3-039]** concludes that there is no significantly better environmental option for the crossing of the Alltami Brook watercourse compared to the proposed trenched crossing.

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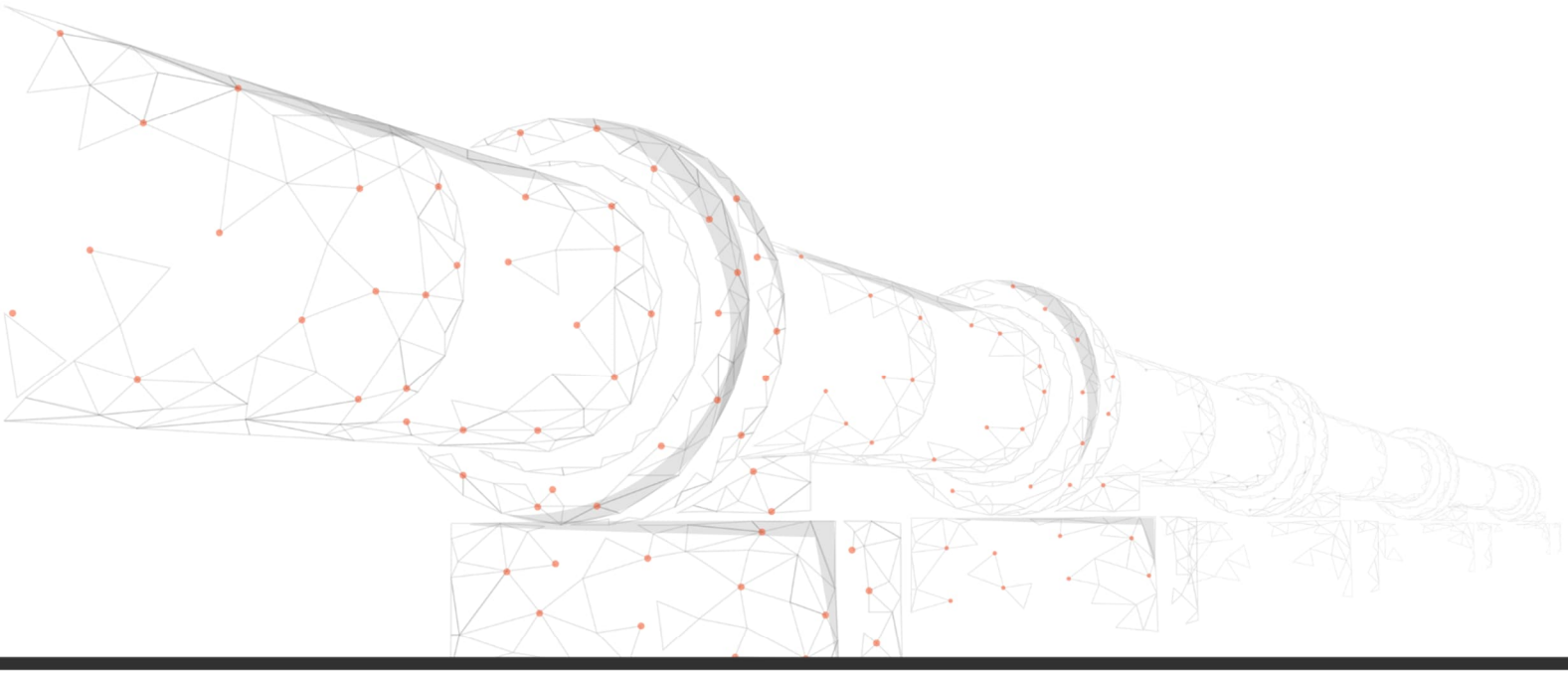
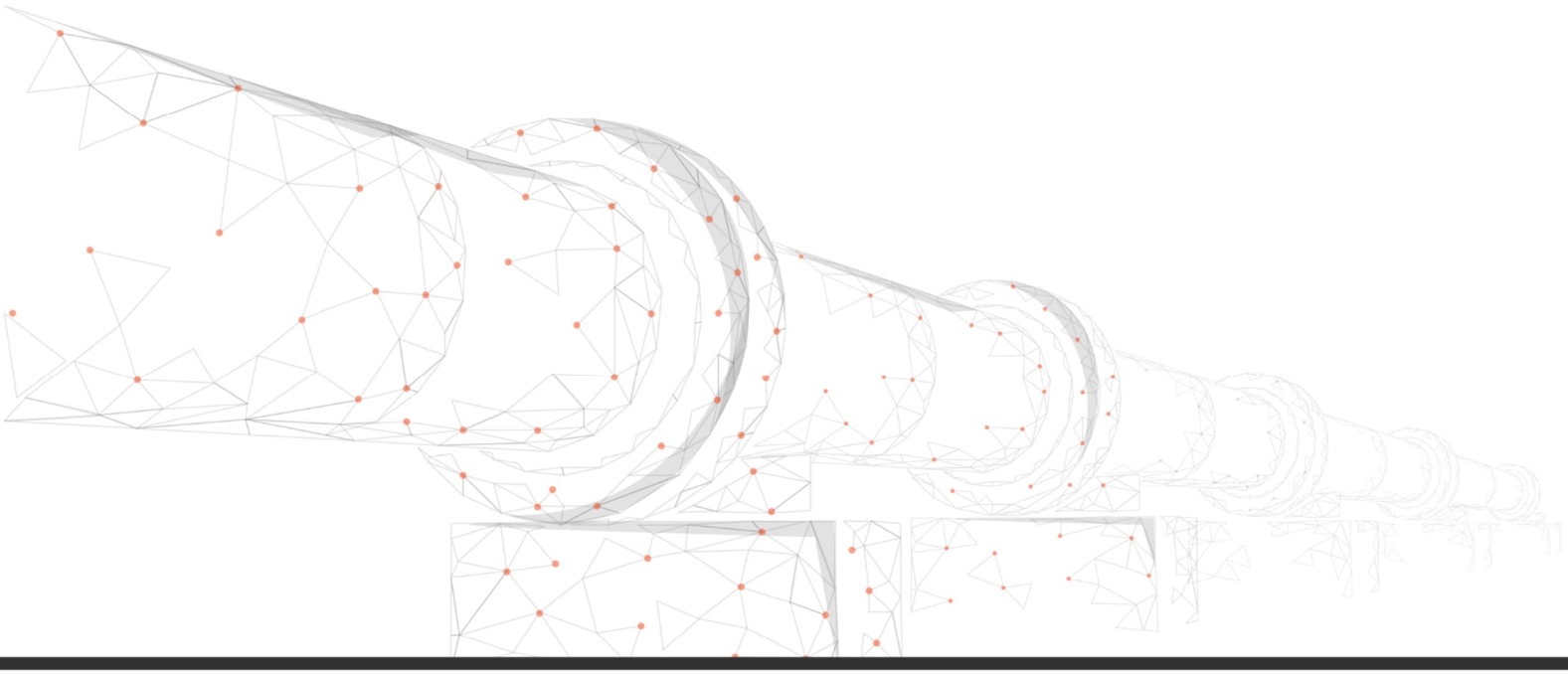
Annexures



Annex A

GLOSSARY



GLOSSARY

A glossary of key terms associated with the WFD used within this report are provided in Table A1-1.

Table A1-1 – WFD Terminology

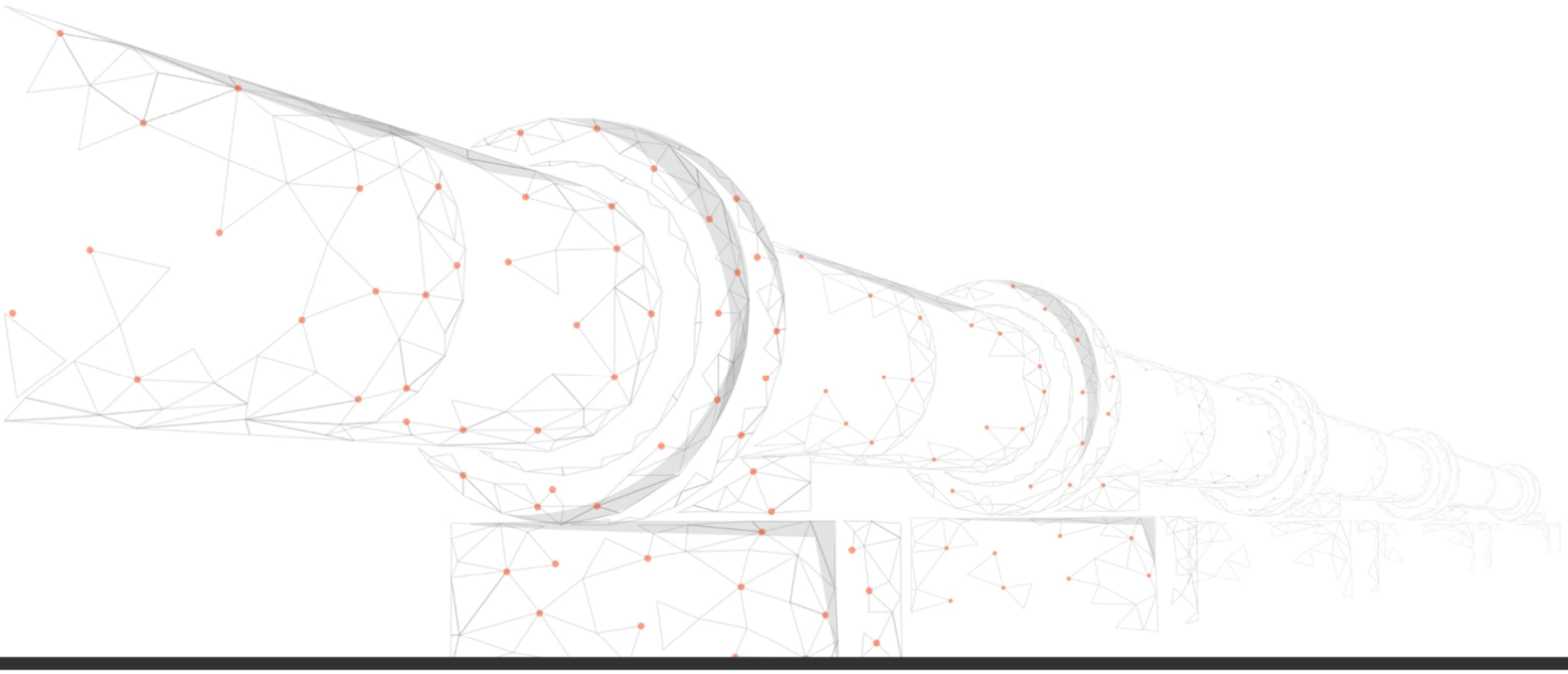
Term	Definition
Compliance	Adherence to the requirements of the WFD legislation.
Ecological status	This defines the condition of the water body in terms of the structure and functioning of the aquatic ecosystems associated with surface waters. The classification of ecological status is undertaken in accordance with Annex V of the WFD legislation.
Groundwater	All water which is below the surface of the ground in the saturated zone and in direct contact with the ground or subsoil.
Groundwater status	Groundwater status consists of both quantitative (the amount of groundwater) and chemical (the quality of groundwater) components.
River Basin District (RBD)	The area of land and sea, made up of one or more adjacent river basins together with their associated groundwaters and coastal waters.
River Basin Management Plan (RBMP)	The preparation of a RBMP is required under the WFD legislation for each RBD. The RBMP should outline the current status of all water bodies and identify measures for achieving the protection, improvement and sustainable use of water within the catchment area of rivers.
Water body	A discrete and significant element of a surface water, such as a lake, reservoir, stream, river or canal, part of a stream, river or canal, a transitional water (estuary) or a stretch of coastal water. Groundwater bodies are defined as distinct volumes of groundwater within an aquifer or aquifers.
High ecological status	WFD term used for natural surface water bodies denoting only very minor or no deviation from undisturbed ‘natural’ reference conditions in a water body for hydromorphological, biological and physico-chemical quality elements.

Term	Definition
Good ecological status (GES)	GES is a WFD term denoting a slight deviation from 'natural' reference condition in a surface water body of the hydromorphological, biological, and physico-chemical conditions associated with little or no human pressure.
Good ecological potential (GEP)	Surface waters that have been identified as heavily modified water bodies must achieve GEP. GEP is a recognition that changes to morphology could make meeting GES very difficult to achieve.
Good chemical status	Good chemical status is achieved in a surface or groundwater body in which concentrations of pollutants do not exceed the environmental quality standards established in Annex IX and under Article 16(7) for surface waters and table 2.3.2 of Annex V for groundwater.
Good quantitative status	Quantitative status is an expression of the degree to which a body of groundwater is affected by direct and indirect abstractions. Good quantitative status is achieved in a groundwater body when: • the level of groundwater in the groundwater body is such that the available groundwater resource is not exceeded by the long-term annual average rate of abstraction; • the groundwater is not subject to anthropogenic alterations that could result in: a) failure to achieve environmental objectives for associated surface waters; b) any significant diminution in the status of such waters; c) any significant damage to terrestrial ecosystems which depend directly on the groundwater body; and • there are no alterations in flow direction that could result in a sustained anthropogenically induced saline intrusion.
Groundwater status	The status of a body of groundwater, determined by the poorer of its quantitative status and its chemical status.
Biological quality elements	Ecological receptors that form the biology in both coastal and fluvial waters; for example, fish, aquatic flora and phytoplankton.
Physico-chemical quality elements	Parameters that support the assessment of the water quality in surface waters; for example, transparency, thermal conditions, salinity, pH, nutrient conditions and specific pollutants.

Term	Definition
Hydromorphological quality elements	Parameters that define the hydrology and geomorphology of both coastal and fluvial waters. Examples for coastal water bodies include the structure of the intertidal zone and wave exposure; and, for fluvial water bodies include the riparian zone, structure of the bed and banks and lateral and longitudinal connectivity.
Groundwater classification elements	The four component parameters that comprise groundwater quantitative status - saline intrusion, surface water, GWDTE and water balance; and the five component parameters that comprise groundwater chemical status - saline intrusion, surface water, GWDTE, drinking water protected areas and general quality assessment.

Annex B

STUDY AREA: WEPRE BROOK WFD WATER BODY



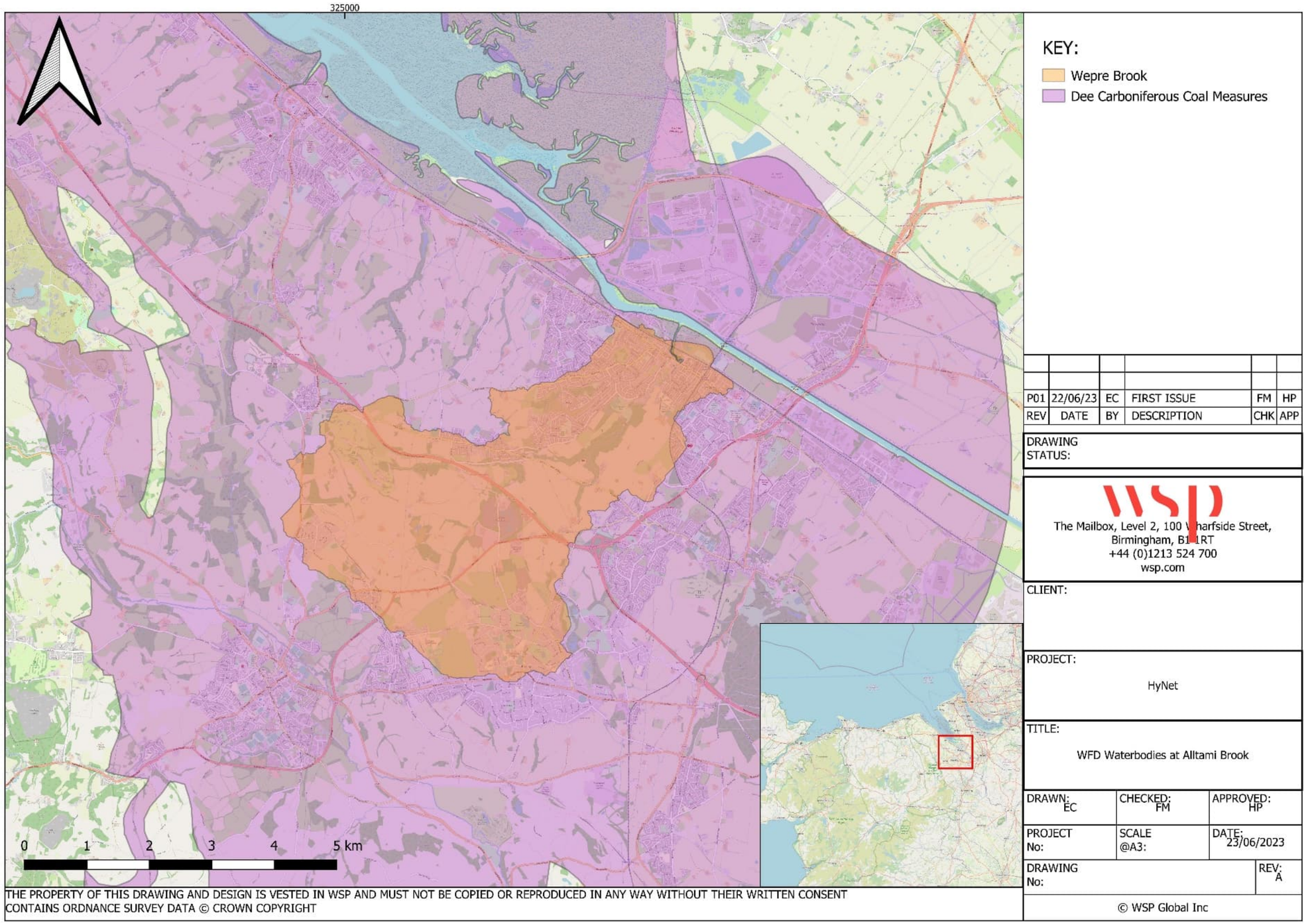
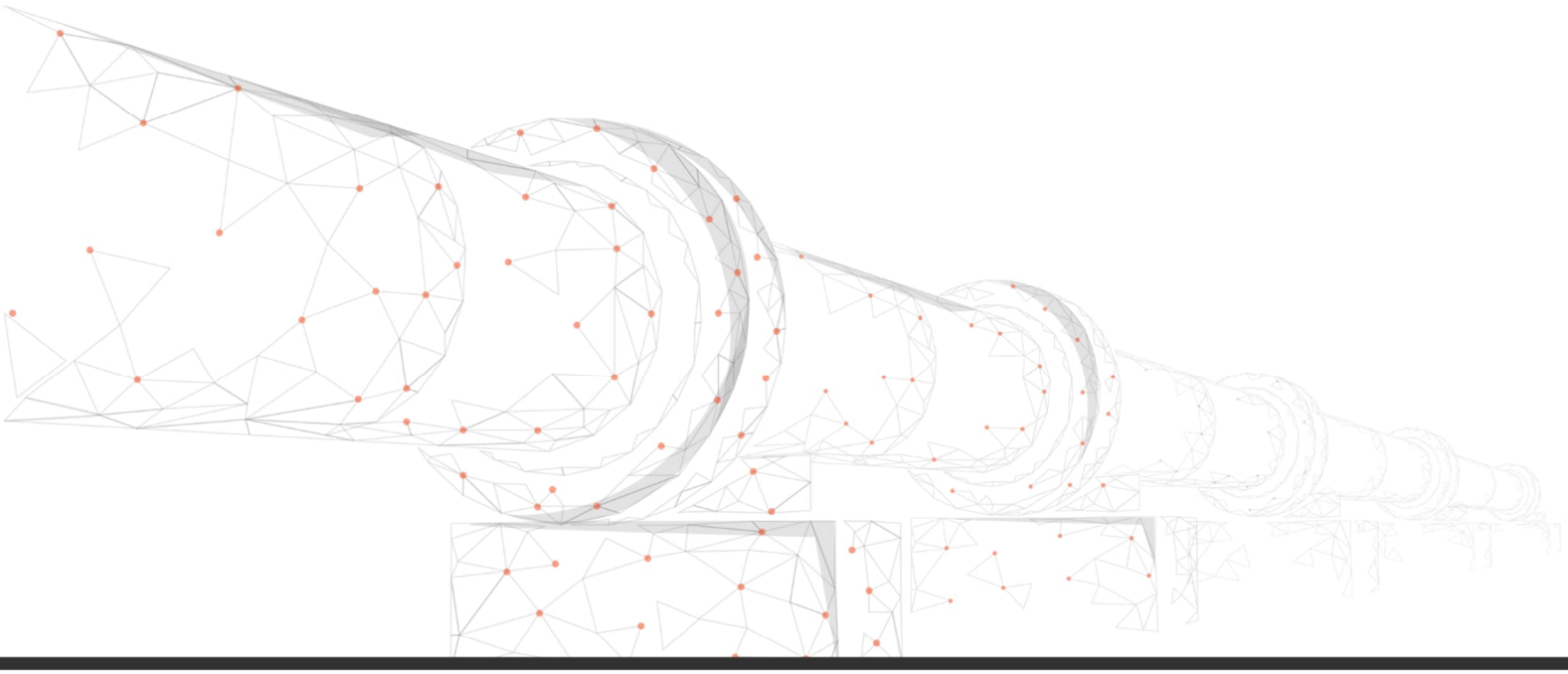


Figure B-1 – Alltami Brook WFD water bodies location map

Annex C

WEPRE BROOK WATER BODY – PHOTOGRAPHIC RECORD



WEPRE BROOK WATER BODY – PHOTOGRAPHIC RECORD

The following tables provide a photographic record of the baseline conditions of both the Alltami Brook (Table C1-1) and the Wepre Brook (Table C1-2), which form part of the overall Wepre Brook WFD water body.

Table C1-1 - Alltami Brook Photographic Record

		
A55 culvert – view looking upstream. Culvert is perched above the natural stream bed.	Channel is over-wide at the culvert outlet and continues to be over-wide through the modified reach where gabion baskets line both banks downstream of the A55 culvert.	View looking upstream towards the A55 culvert outlet showing the transition from the modified reach with gabion basket bank reinforcement.

		
Transition to natural bank downstream of the A55 culvert. Laid stone bank reinforcement on both banks downstream of the gabion baskets.	Step-change in bed level downstream of the modified reach.	Hillslope on the north slope in the vicinity of the proposed crossing location.
		
Made ground on the right bank. Very high and steep engineered bank with a composite bank profile due to slip failures.	Made ground bank profile with surface water puddling due to saturation of the earth.	View looking down to the Alltami Brook from the top of the made ground on the right bank. View looking downstream. Approximate crossing location for the pipeline.

		
Moss and algal growth on the stream bed including bedrock and boulders, indicating low rates of fluvial erosion.	Natural step change in bed level immediately upstream of the proposed pipeline crossing taken in baseflow conditions. Approximate 1.5m change in bed level.	Natural step change in bed level immediately upstream of the proposed pipeline crossing taken in high flow conditions.
		
Groundwater seepage from bedrock observed on the left bank face (SJ 27690 67170). Channel narrows here and was observed to be very fast-flowing following heavy rain and saturated ground.	Seepage observed from bedrock on the left bank face immediately upstream of SJ 27726 67182.	Fallen and leaning trees are characteristic of the Alltami Brook and provide natural riverine habitat.

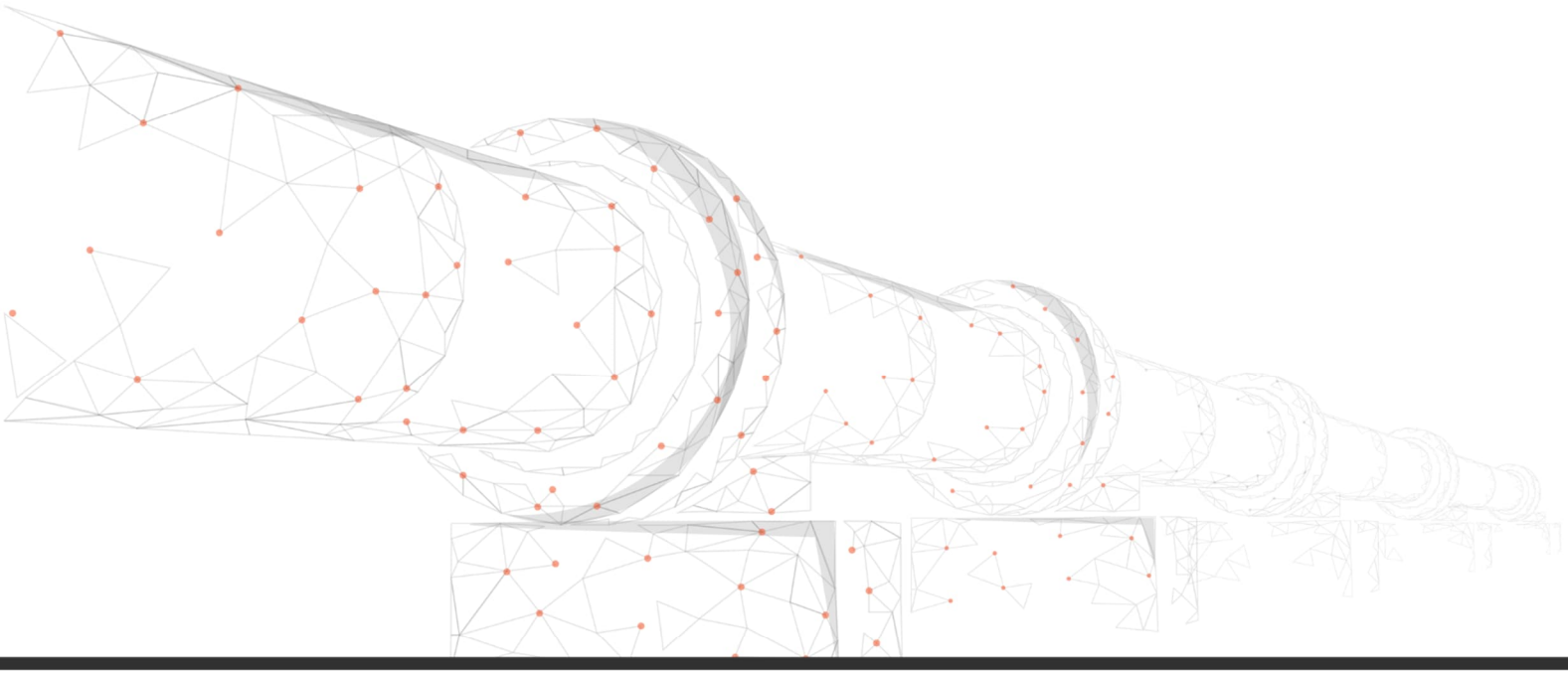
		
Land drainage pipe discharging water into the brook on the right bank face. Small volume of water seeping from the pipe. SJ 27726 67182.	Surface water flow draining the right bank hillside into the Alltami Brook at SJ 27793 67229 following heavy rain overnight.	Meander bend on the Alltami Brook looking downstream, Observation taken following heavy rain overnight.
		
Meander bend on the Alltami Brook looking downstream, Observation taken following dry conditions.	Mid-channel bar feature near the confluence with the Wepre Brook.	Confluence with the Wepre Brook, view looking upstream from the road bridge.

Table C1-2 – Wepre Brook Photographic Record

		
Upstream reach of Wepre Brook in the vicinity of the proposed outfall from the Northop Hall AGI.	Wepre Brook in the vicinity of the proposed pipeline crossing. Watercourse culverted beneath the road.	Wepre Brook in the vicinity of the proposed pipeline crossing. View looking downstream from the culvert.
		
Wepre Brook in the vicinity of the proposed pipeline crossing.	Upstream of the confluence with Alltami Brook showing cobble and gravel substrate.	Upstream of the confluence with Alltami Brook with trash in the channel.

Annex D

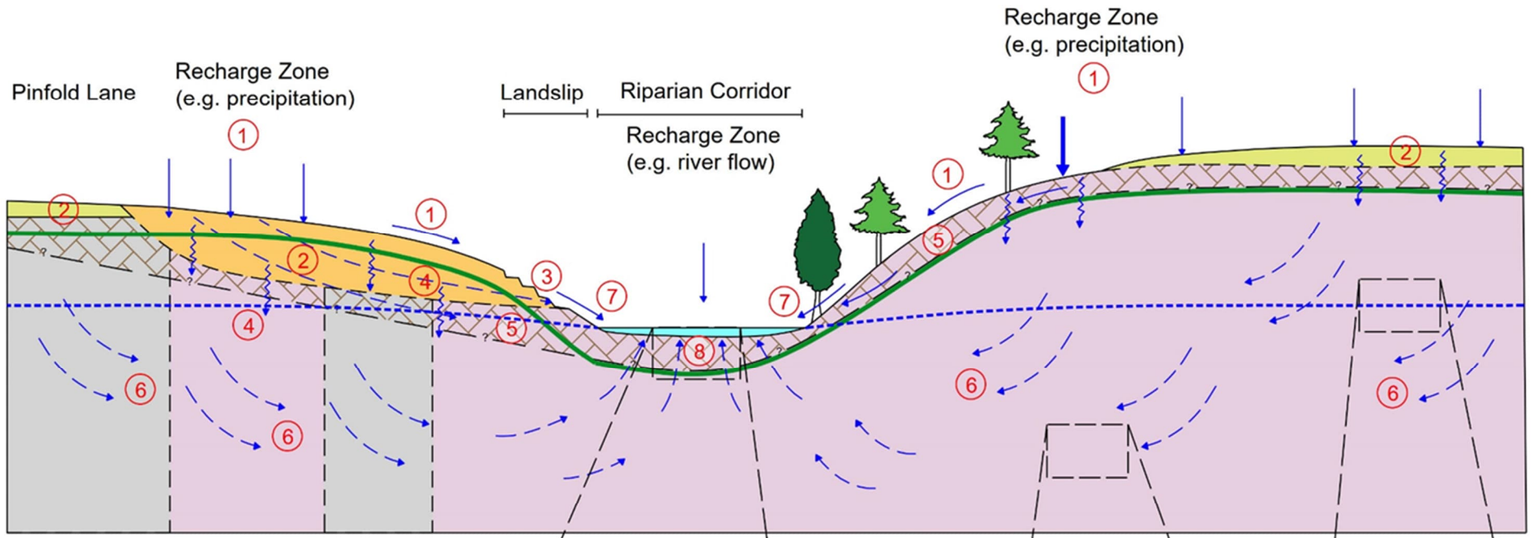
PRELIMINARY HYDROGEOLOGICAL CONCEPTUAL MODEL



PRELIMINARY HYDROGEOLOGICAL CONCEPTUAL MODEL

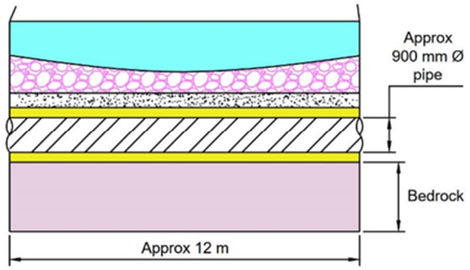
The preliminary hydrogeological conceptual model, which presents a simplified version of a complex hydrogeological system, is presented below.

SCHEMATIC REPRESENTATION OF PRELIMINARY CONCEPTUAL SITE MODEL

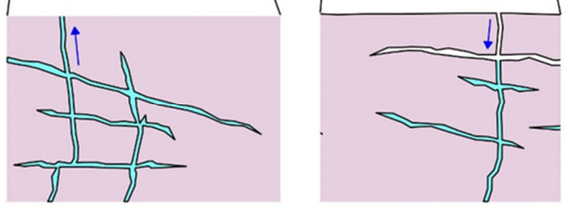


Notes:

1. Local recharge e.g. by precipitation and run-off into channel.
2. Perched water (seasonally variable level) controlled by permeability of Made Ground/Fill and Glacial Till.
3. Percolation through Made Ground/Fill discharging downslope via seeps into river channel.
4. Percolation through Made Ground/Fill into bedrock via joints, bedding plane, fissures or fractures.
5. Lateral and vertical flow via weathered bedrock in exposed outcrop in valley.
6. Groundwater movement in bedrock via fracture flow; flow direction controlled by dominant fractures, fissures, joints and bedding planes (where present) allowing throughflow, with potential discharge into river valley.
7. Groundwater seeps in exposed bedrock discharging to river channel.
8. Baseflow into watercourse.



SCHEMATIC TO SHOW PROPOSED PIPELINE



SCHEMATICS TO SHOW FRACTURE FLOW IN BEDROCK

Key:

- Made Ground/Fill
- Glacial Till
- Gwespyr Sandstone
- Lower Pennine Coal Measures (LPCM)
- Base of Made Ground and Till (Unknown)
- Zone of weathered bedrock
- Buried pipeline
- Vegetation
- Granular fill surrounding the pipe
- Concrete plinth/slab
- Natural rock embedded in cementitous material
- Weathered bedrock
- Inferred groundwater flow (via fractures, fissures)
- Alltami Brook
- Inferred groundwater level

PROJECT TITLE
HyNet Carbon Dioxide Pipeline DCO

DRAWING TITLE
PRELIMINARY CONCEPTUAL SITE MODEL

DRAWING STATUS
FOR ISSUE

DRAWN	CHECKED	APPROVED	AUTHORISED
HS	JC	DH	CL

SCALE @ A3 SIZE	DATE	REVISION
Not to Scale	16/06/2023	P01

DRAWING NUMBER
70070865-1001-CM-0001-5