HyNet North West

APPLICANT'S COMMENTS ON SUBMISSION RECEIVED AT DEADLINE 6 FROM NATURAL RESOURCES WALES [REP6-049]

HyNet Carbon Dioxide Pipeline

Planning Act 2008

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1. INTRODUCTION

1.1. PURPOSE OF THIS DOCUMENT

1.1.1. This document has been prepared on behalf of Liverpool Bay CCS Limited ('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 Business, Energy and Industrial Strategy (BEIS) under Section 37 of the Planning Act 2008 ('the PA 2008'). The Application relates to the carbon dioxide (CO_2) pipeline which constitutes the DCO Proposed Development.

1.1.2. This document provides the Applicant's comments on submissions received at Deadline 6 from Natural Resource Wales (NRW) **[REP6-049]**. Its purpose is to make clear to the ExA the latest position between the Applicant and NRW.

1.1.3. The Applicant has considered it necessary to enter its response to **[REP6-049]** into the Examination earlier than deadline 7 as prescribed in the Rule 8(3) letter **[PD-026]**.

1.2. THE DCO PROPOSED DEVELOPMENT

1.2.1. 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.

1.2.2. A full description of the DCO Proposed Development is detailed in Chapter 3 of the consolidated Environmental Statement (ES) **[REP4-029]**, submitted at Deadline 4. On the 12 July 2023, the ExA accepted the Applicant's Change Request 3, subsequently the description of the development will be updated in accordance with Change Request 3 Environmental Technical Note **[CR3-019]**, towards the end of the Examination.

2. APPLICANT'S COMMENTS ON SUBMISSION RECEIVED AT DEADLINE 6 FROM NATURAL RESOURCES WALES

2.1. APPLICANT RESPONSE TO NRW COVER LETTER

The Applicant has also submitted its Water Framework Directive Derogation Case for the Alltami Brook Crossing [REP5-016] at Deadline 5. It should be noted that NRW has provided clear advice to the Applicant as to the requirements under WFD in particular making clear that Article 4(7) would need to be considered. It is a matter of regret that this advice was not acceded by the Applicant until a late stage in the examination. A 'without prejudice' derogation report in support of the Applicant's preferred option has now been submitted. The information in the derogation report is significant and requires detailed consideration. NRW will review as a priority and will provide its advice to the Examining Authority as soon as possible. Pending this review, NRW is not in a position to provide further substantive advice at this deadline.

Our comments are made without prejudice to any further comments NRW may wish to make in relation to this application and examination whether in relation to the ES, provisions of the draft DCO and its Requirements, SoCG or other evidence and documents provided by Liverpool Bay CCS Ltd. and their consultants ('the Applicant'), the Examining Authority or other interested parties.

Applicants Response

2.1.1. The Applicant has actively engaged with NRW both through the preparation of the DCO Application and throughout the Examination period. The Applicant has held several meetings with NRW to discuss their objections raised within their Relevant Representations [REP1-071]. NRW advised in their Relevant Representations that "further information should be submitted by the Applicant to inform a risk assessment of the proposed Alltami Brook crossing open-cut option so that its viability can be assessed". The Applicant has therefore been undertaking the further assessment work specifically requested by NRW during this period. In addition, via consultation with NRW, the scope of the assessment work has been discussed and agreed.

2.1.2. The record of engagement with NRW is captured within the SoCG **[REP6-028]**. With regards to the WFD derogation, the Applicant made a concerted attempt to resolve the specific issues raised in the anticipation of avoiding the need for a derogation and engagement is ongoing.

2.1.3. NRW did not raise any concerns regarding hydrogeology and potential loss of water flow during consultation meetings during the preparation of the DCO Application. Prior to submission of the DCO Application, NRW stated that they were opposed to the trenched methodology but stated that was due to them not wanting to permit a

cut through bedrock. The concerns regarding the potential loss of flow were only raised by NRW at Deadline 1 and the Applicant has been undertaking considerable additional assessment work to provide sufficient evidence to assure NRW of the Applicant's position that there is no risk of discernible loss of flow to the Alltami Brook.

2.1.4. Following the hearings held in June 2023, the Applicant moved to the position of preparing a Without Prejudice WFD derogation due to the position NRW took during the hearing **[REP5-016]**.

2.2. APPLICANT RESPONSE TO ANNEX A: HYDROGEOLOGICAL IMPACT APPRAISAL OF OPEN CUT CROSSING, ALLTAMI BROOK [REP5-014]

NRW has reviewed the Applicant's Hydrogeological Impact Appraisal (HIA) of Open Cut crossing, Alltami Brook [REP5-014] submitted at Deadline 5 of the HyNet CO2 Pipeline NSIP examination and our advice to the Examining Authority is as follows.

NRW notes that the HIA concludes that: "There is not considered to be a mechanism present which would allow a discernible loss of flow from the Alltami Brook to the underlying bedrock aquifer" and "…the DCO Proposed Development is not considered to be a risk to impacting the WFD status of the Wepre Brook surface water body".

An Article 4(7) WFD derogation report [REP5-016], which refers to and relies upon the conclusions of the HIA, has been prepared by the Applicant and submitted at Deadline 5 for this NSIP examination. NRW is currently reviewing this document and will provide its advice to the Examining Authority as soon as possible.

In summary, NRW acknowledges that the Applicant has developed a conceptual model (a simplified representation of a complex geological and hydrogeological setting) for the site of the Alltami Brook crossing. The Applicant affords significant weight to this model within their WFD Article 4(7) derogation case. However, there is evidence to suggest that the actual geological site conditions are far more complex than indicated by the conceptual model. In our view, this creates uncertainty in the level of reliance that can be afforded to the conceptual model as a predictive tool. Due to the reliance placed on the conceptual model to determine whether or not there may be a deterioration in Water Body status, NRW does not have confidence in the Applicant's conclusions for the reasons set out below.

Applicants Response

2.2.1. The Applicant acknowledges that NRW is currently reviewing the Without Prejudice Water Framework Directive Derogation Case for Alltami Brook Crossing **[REP5-016]** and that NRW will provide comments in due course at Deadline 6A.

2.2.2. In respect of Annex A, paragraph1.4, of Submission Received at Deadline 6 from NRW **[REP6-049]**, the Applicant re-affirms that the conceptual model is a simplified representation of a complex geological and hydrogeological setting at the proposed crossing point on the Alltami Brook. Based on the lines of evidence presented, it provides a reasoned framework for considering how the DCO Proposed Development may impact the baseline conditions of the watercourse. The Applicant has not (as suggested by NRW) used the conceptual model as a 'predictive tool', rather it has been used to consolidate the current understanding of uncertainties and to consider potential outcomes based on an understanding of lithology, aquifer properties, and hydrogeological principles.

2.2.3. Based on the conceptual understanding, the Applicant does not agree that the worst-case scenario, as proposed by NRW, is a likely outcome of the DCO Proposed Development. Under this scenario, flow from the Alltami Brook would be lost to ground/mine workings, resulting in the watercourse drying up downstream and consequently a significant deterioration of the WFD waterbody status of Wepre Brook. In order for such a scenario to be realised, the geological and hydrogeological conditions at the crossing point would need to be markedly different to the prevailing conditions that have been identified through various information sources. For example, there would need to be an extensive, highly transmissive, unsaturated zone beneath the watercourse, which is vertically and laterally continuous, allowing for a continuous discharge of flow to ground.

2.2.4. The additional information presented by NRW in Annex A, paragraphs 1.5 - 1.9 of Submission Received at Deadline 6 from NRW **[REP6-049]** appears to support the Applicant's interpretation of the aquifer characteristics in principle. This being that the Gwespyr Sandstone has a low primary porosity and that flow is dominated by fracture or fissure flow, the extent of which will be determined by the size and transmissivity of any particular feature in the bedrock. In some locations, faulting may inhibit groundwater flow. The result is a groundwater regime that is 'compartmentalised' and discontinuous both laterally and vertically, which may result in different groundwater levels being observed both spatially and temporally.

2.2.5. In recognising this, the Applicant interprets that on a catchment scale, the river valley will act as a natural discharge point (or sink) for groundwater seeps and discharges from bedrock, in which water from hydraulically connected transmissive fissures or fractures will naturally flow via gravity from higher to lower topographical elevations; or where available groundwater in the deeper bedrock may connect from an area of high groundwater pressure to low groundwater pressure (atmospheric conditions). Such discharge features were observed to be flowing during the site walkover. Based on these hydrogeological principles, the conceptual model assumes that there will be a contribution to river flow from groundwater where conditions allow. The conceptual model presented by the Applicant clearly identifies

these elements and does not, as indicated by NRW in Annex A paragraph 1.12 of Submission Received at Deadline 6 from NRW **[REP6-049]**, conclude that there is a 'consistent bedrock groundwater contribution to the Alltami Brook'.

2.2.6. NRW indicates in Annex A, paragraph 1.10 of Submission Received at Deadline 6 from NRW **[REP6-049]**, that it is possible that 'excavation into bedrock could be within unsaturated fractured bedrock'. As stated above, the Gwespyr Sandstone is well cemented and has low primary porosity, which indicates that the pore spaces are tightly packed and will largely preclude groundwater movement and/or storage. Therefore, there is no 'unsaturated bedrock', as such, to receive surface water losses. Furthermore, until demonstrated by ground investigation, there is no evidence provided by NRW to suggest that 'unsaturated transmissive fractures' are present at the proposed crossing point. If this were the case, then it is likely that the watercourse would currently be losing water under current baseline conditions, which was not observed during the site walkover, even where faults are recorded in the river valley.

2.2.7. The Applicant does not accept NRW's position that uncertainties in the conceptual understanding cannot be appropriately managed through mitigation implemented in the design of the open-cut crossing. The reasons for this are explained in the below responses.

Table 2.2 of the HIA presents information from four boreholes located along the A55 in proximity to the proposed Alltami Brook crossing point. NRW's review of the British Geological Survey's (BGS) GeoIndex shows the presence of other boreholes in the vicinity and their respective borehole logs which have not been considered in the HIA. These boreholes are shown on Figure 1 below, which also includes the approximate distance from the A55 to the proposed Alltami Brook crossing point. The information from the full complement of boreholes reveals that groundwater may not be present, and where it is found to be present the depths to which it is encountered vary. The information from the boreholes presented in the HIA is therefore not considered to be comparable or to provide a sense of continuity in the hydrogeological regime in the locale of the Alltami Brook crossing point. In addition, the boreholes presented in the HIA are installed within different geological units in comparison to the geological units within which the proposed pipeline would be installed, i.e., an 'isolated younger outcrop of Pennine Lower Coal Measures mudstone, siltstone and sandstone surrounded by the older Gwespyr sandstone (see Figure 3 below).

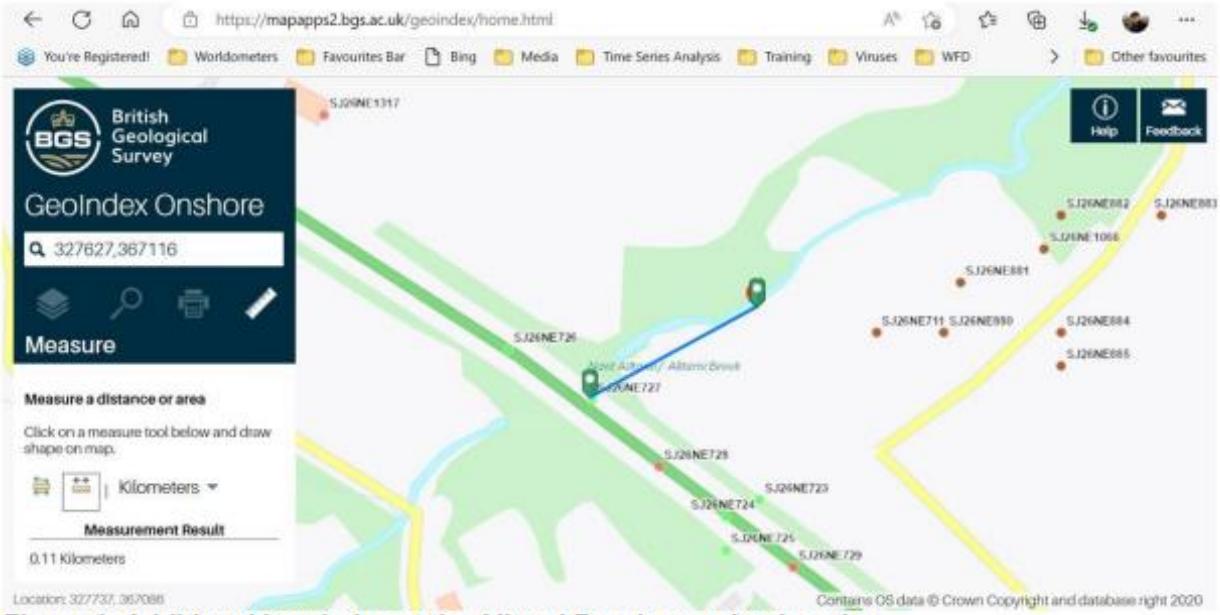

Figure 1: Additional boreholes at the Alltami Brook crossing location

Applicants Response

2.2.8. With regard to Annex A, paragraphs 1.5-1.7 Submission Received at Deadline 6 from NRW **[REP6-049]**, NRW has provided an interpretation of the available borehole records, published by the British Geological Survey (BGS), which is the same dataset used by the Applicant. The Applicant acknowledges the availability of additional borehole records, and considered these when preparing the HIA. The Applicant presents further summary of the groundwater levels recorded at these boreholes.

2.2.9. The boreholes that indicate a very shallow or slightly artesian pressure upon completion are (note that these boreholes are all approximately 12-15m deep):

- SJ26NE726 (no completion water level but recorded at ground level at 1 metre before reached completion depth)
- SJ26NE727 (+ 0.3mAOD on completion)
- SJ26NE723 (at ground level on completion)
- SJ26NE724 (at ground level on completion)
- SJ26NE725 (at ground level on completion)

2.2.10. The borehole which was indicated that it was dry upon completion is (~40m deep):

- SJ26NE729

2.2.11.] In paragraph 1.7 of the Submission Received at Deadline 6 from NRW **[REP6-049]** reference is made to borehole SJ26NE729, which the driller's log reports was dry upon completion. It should be noted that this is a single reading from one borehole which reports dry conditions, therefore, there is some question over the

validity of this. Another borehole, SJ26NE728 (of a similar depth to SJ26NE729), did not record a reading.

2.2.12. The Applicant understands that the boreholes along the A55 are in a different geology, and so may not be entirely representative of conditions at the preferred crossing location. However, they are installed within the same WFD groundwater body and have the potential to be in hydraulic continuity with the aquifer at the preferred crossing location, however also acknowledging that flow conditions in this area are laterally discontinuous, meaning that there is relatively little horizontal flow over longer distances.

2.2.13. The interpretation of the borehole records by NRW does not support its wider contention that there is potential for a significant loss of flow from the watercourse because there needs to be a direct flow pathway from the river into ground allowing a large, continuous flow of water out of the river system. Therefore, NRW's argument that flow conditions are not continuous does not lend itself to this being a realistic mechanism for significant flow loss.

The BGS 1:10,000 map excerpt (Figure 2 below) shows the disc-like boundary outline (outlier) of the Lower Coal Measures Unit (md) with the Gwespyr sandstone (Gwp) to the east and a NE to SW trending fault to the west, demarcating the outlier within which the pipeline is proposed to be installed. Figure 2 (below) shows a number of faults, one of which is located between the crossing point and the particular boreholes on the A55 that have been presented within Table 2.2 of the HIA. Therefore, in the absence of any site specific ground investigation data, it is not considered possible to be certain that there is groundwater connectivity between the groundwater encountered in the boreholes along the A55 and the proposed crossing point. Rather, the fault could function as a hydraulic barrier to flow and the particular outcrop of the lower Coal Measures and Gwespyr sandstone at the crossing point could be unsaturated bedrock. It is possible that any groundwater contribution to the Alltami Brook in the crossing-point locale is inconsistent in its nature, i.e., in some locations there may be contribution and in other locations it may be completely absent. Any groundwater contribution will largely be controlled by the presence of transmissive fractures, if present, the influence of faults in terms of helping or hindering groundwater flow and lithological control.

Figure 2: BGS 1:10,000 map excerpt for the proposed Alltami Brook crossing location

Applicants Response

2.2.14. The Applicant does not consider it necessary to establish whether there is hydraulic connectivity between the historic A55 boreholes and the preferred crossing location. This information from these historic boreholes (drilled in the mid-1970s) is not relied upon in the HIA as one sole piece of conclusive evidence, rather it is referred to as an aid to developing the wider conceptual understanding of the hydrogeological conditions in the area, along with the other pieces of evidence/information presented in the HIA.

2.2.15. The technical report “The physical properties of minor aquifers in England and Wales”, Jones et al. (2000) also describes the bedrock aquifers in the area as being primarily driven by fracture flow in a multilayered system, with the argillaceous strata and sandstones possessing minimal primary porosity. Therefore, the presence of an “unsaturated bedrock” as suggested by NRW is not a realistic possibility as it requires the presence of unsaturated secondary porosity features e.g., fractures, fissures etc. which may not be present at all.

Furthermore, Borehole SJ26NE727 presented in Figure 2.2 and Table 2.2 of the HIA states that the well was drilled to 15.1m which yields a borehole base elevation of 64.4m AOD. This is below the proposed Alltami Brook crossing point elevation which is ~73m AOD: as the excavation is approximately 4m deep this gives an excavation elevation of ~69m AOD. The borehole log describes fluid loss at 4.5m depth yet encountering groundwater at 14.3m (i.e., below the level of Alltami Brook), although this rises to +0.3m due to pressure. We also note that there are two largely dry boreholes located along the A55, drilled to a greater depth of 40m (Boreholes SJ26NE728 and SJ26NE729). It is possible that Borehole SJ26NE727 encountered a transmissive fracture at depth whereas Boreholes SJ26NE728 and SJ26NE729 did not. This highlights the lack of consistency in the ground materials and groundwater

conditions at the site. In our view, it is therefore not possible to rely upon the information from any one borehole regarding the potential contribution of bedrock groundwater levels to the Alltami Brook, as the information is inconsistent between them. In addition, the geology encountered along the A55 is of a different time period in comparison to the expected geology at the Alltami Brook crossing and is separated from the geology at the crossing point by a fault.

Applicants Response

2.2.16. The Applicant disagrees that borehole SJ26NE728 was dry upon completion. There is no information present on the log which states this. Additionally, the log for SJ26NE729 does indicate it was dry upon completion, but this is only one reading. Whereas there are x5 boreholes showing that the water level was shallow/at ground surface upon completion.

2.2.17. The Applicant agrees that it is not possible to rely upon the information from any one borehole in isolation regarding the potential contribution of bedrock groundwater levels to the Alltami Brook. This was not intended by the Applicant and the borehole records are only one source of information used to help develop the conceptual understanding of the hydrogeology area, which is necessary in determining whether NRW's scenario for a significant loss of flow to ground is a realistic outcome.

The following excerpt (Figure 3 below) is from the NRW Geospatial Map viewer and shows the relationship of the proposed Alltami Brook crossing point to the seepage reported in the HIA (para. 2.7.9); it has been drafted using coordinates presented by the Applicant. Based on the mapping shown in Figure 3 below the seepage appears to be a contact seepage between the two different coloured units (designated as pink and grey in Figure 3) so may not be a fracture flow contribution, as hypothesised by the Applicant, but rather a manifestation of the permeability difference between where sandstone and mudstone contact each other, for example. This seepage point is approximately 120m downstream from the proposed crossing point and is at a lower elevation. The estimated crossing point elevation is ~73m AOD.

Applicants Response

2.2.18. The Applicant notes that the location of the preferred crossing point on Figure 3 in Submission Received at Deadline 6 from NRW **[REP6-049]** is incorrect; the [correct] grid reference SJ 27650 67144 places it in the centre of the area of Gwespyr Sandstone (not on the Coal Measures as shown on Figure 3).

2.2.19. According to the Ordnance Survey (OS) mapping, the elevation at the preferred crossing point (SJ 27650 67144) is approximately 76mAOD. According to the OS, the elevation at the boundary between the Gwespyr Sandstone and the Pennine Lower Coal Measures is approximately 73mAOD.

2.2.20. Paragraph 2.79 of the HIA states: “During the site walkover, groundwater seepage issuing from the bedrock was observed at NGR SJ 27726 67182 (see photos in Annex A). This is located at the boundary of the Lower Coal Measures Formation (mudstone) and the Gwespyr Sandstone according to the geological map. This observation suggests that the Gwespyr Sandstone in the area is likely to be saturated and may contribute baseflow to the Alltami Brook.”

2.2.21. Therefore, this interpretation by the Applicant is in agreement with the statement made by NRW (Annex A, paragraph 1.8 of Submission Received at Deadline 6 from NRW **[REP6-049]**), i.e., that the seepage is coming from the boundary between the two rock types. This supports the Applicant’s position, as it indicates that groundwater is near or at ground level and there is an upwards hydraulic gradient from the bedrock which provides a contribution of baseflow to the watercourse.

The seepage is therefore not considered reconcilable to the crossing point itself because the fault that is immediately upgradient of the crossing point may hinder groundwater flow in the bedrock. It is unlikely that there is consistent contribution of bedrock groundwater flow along the reach of Alltami Brook because such contribution would require a consistent network of saturated and transmissive fractures to intersect Alltami Brook. Figure 3.1 of the HIA (Preliminary Hydrogeological Conceptual Model) would suggest that such a consistent and spatially extensive network of saturated and transmissive fractures exists, which is unlikely to be the case as the borehole logs suggest, coupled with the possibility that local faulting hinders the continuity of groundwater flow.

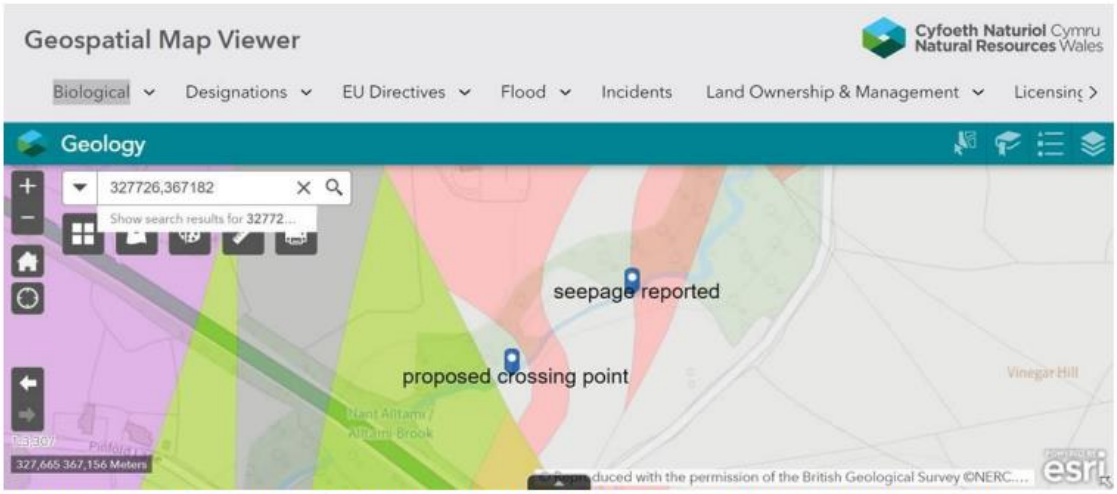

Figure 3: the relationship of the proposed Alltami Brook crossing point to the seepage reported in the HIA (para 2.7.9).

Based on this evidence it is therefore possible that excavation into bedrock at the Alltami Brook crossing point could be within unsaturated fractured bedrock. During the operational phase of the pipeline, if this were to be the case and grout washout of the infilled fractures were to occur, water loss from Alltami Brook could be to

unsaturated transmissive fractures. This is in direct contrast to the statement made in the HIA (para. 3.3.4), that:

"The reason (for no loss of Brook flow) is because the conceptual understanding of the area indicates that there is a groundwater baseflow component to the Alltami Brook resulting from an overall upwards hydraulic pressure/flow gradient from bedrock (where fractures allow)."

The above statement suggests that flow from the bedrock is consistent. In our view this is considered to be unlikely, rather that groundwater flow will be limited to some transmissive fractures while other fractures remain largely dry. Based on the evidence presented above, NRW considers that given the geological and hydrogeological complexities at the proposed pipeline crossing point and the inconsistent hydrogeological information revealed by the local boreholes (which are not considered to be reconcilable to the geology and hydrogeological conditions at the crossing point), it cannot be ruled out that the proposed Alltami Brook crossing point could be underlain by unsaturated fractured bedrock. It is equally possible that 50m up or downstream of the crossing point, this is not the case, which demonstrates the inconsistency in fractured rock behaviour. This is particularly pertinent when considering the Applicant's statement that:

"there is an approximately 200 m stretch of the Alltami Brook within which the river crossing could be built within the Newbuild Infrastructure Boundary".

Therefore, based on the evidence presented, NRW advises that the geology of the Alltami Brook crossing point location is complex. NRW does not agree with the Applicant's conclusion that there is a consistent bedrock groundwater contribution to the Alltami Brook in all locations (an upwards hydraulic gradient). and in the absence of site-specific ground investigation data, NRW does not have confidence in the Applicant's conclusions.

Applicants Response

2.2.22. The Applicant is concerned that in Annex A, paragraphs 1.11 and 1.12 of Submission Received at Deadline 6 from NRW **[REP6-049]**, NRW has incorrectly paraphrased the Applicant's conclusions on groundwater flow in the HIA. For clarity, it is not stated or interpreted within the HIA that 'there is a consistent bedrock groundwater contribution to the Alltami Brook'. The flow to the Alltami Brook from bedrock does not need to be consistent along the entire stretch. It is already acknowledged that flow conditions are laterally discontinuous and localised. Furthermore, paragraph 4.1.1 of the HIA acknowledges that groundwater baseflow will only contribute to the overall flow in the watercourse where sufficient fracturing facilitates it.

2.2.23. Additionally, if the Applicant is to accept NRW's position as stated that there is not a consistent network of saturated and transmissive fractures intercepting Alltami

Brook, which the Applicant agrees with, then the question becomes what is the receptor present which would be capable of accepting the continuous substantial discharge from the Alltami Brook to impact WFD status. If a fracture system is localised to a particular area, then should water from the Alltami Brook discharge into it, it will quickly fill with water and then that fracture system would not be able to receive any more water and the discharge will cease and the system will effectively rebalance itself.

2.2.24. In Annex A, paragraph 1.10 of Submission Received at Deadline 6 from NRW **[REP6-049]**, NRW refers to the possibility of 'grout washout' during the operational phase of the pipeline where fractures are infilled as part of construction works. This is a concern that has been expressed by NRW on a number of occasions in formal representations and informal discussions. The Applicant notes that there is no evidence to suggest that any transmissive features are present in the bedrock beneath the proposed crossing location.

2.2.25. The Applicant draws to the attention of NRW that a variety of established methods are routinely employed to control groundwater flow in fissured bedrock in construction projects and that there are British Standards (BS EN 12715:2020 Execution of special geotechnical work - grouting) that provide information on various methods of grouting, execution, monitoring, and testing. The approach to grouting, if required, will be developed by a specialist, competent contractor appointed by the Applicant,. However, in principle, any grouting of fractures would likely be done through injection under pressure with specific procedures and controls on grout uptake and losses. is very unlikely in the long term as the grout effectively modifies the ground conditions to prevent flow within any fissures/fractures in the grout zone; the existing geological conditions are not conducive to high groundwater velocities and permeabilities; and the grout zone will effectively be buried beneath the concrete structure that forms a cover to the pipeline.

2.2.26. The Applicant also stands by the statement NRW has quoted (paragraph 3.3.4 of the HIA). The Applicant is not saying that every part of the Alltami Brook has a groundwater baseflow component, as that cannot be the case given the Applicant is not dealing with intergranular flow conditions. Rather, that the conceptual understanding, site setting, and observations indicate that there is a baseflow component present in the Alltami Brook which is enhanced at certain locations. The Applicant knows that fracture flow is localised and laterally discontinuous (as NRW has agreed) and there are certain locations where inflow is likely to be greater i.e., where there is seepage observed, along geological boundaries and along faults and fracture zones. Where these features are not present the connection between groundwater and surface water will be limited because the Applicant knows the underlying aquifers are fracture-flow dominant. But that does not mean unsaturated

fractures in connection with the watercourse are likely. NRW has not demonstrated why this is likely or where these fractures will be directing flow to.

2.2.27. There is a possibility that unsaturated fractures may be encountered at the crossing point. However, these would be partially unsaturated, local fractures. Should water be discharged into these, they would quickly become saturated because there is no identifiable outflow point in this system (besides the Alltami Brook itself).

2.2.28. Whilst the Applicant accepts the possibility that there may be some fractures present which are not saturated and which the open trench may intercept, the Applicant does not accept that these would represent a viable receptor for sustained discharge of flow from the Alltami Brook. A viable outflow pathway must lead to a discharge point which is located outside of this valley which contains the Alltami Brook. However, it has already been established that lateral flow conditions are discontinuous. Therefore, there is no clearly identifiable mechanism to allow for a significant, permanent loss of flow from the Alltami Brook, and especially not through a structure filled with concrete and where any such features would've been infilled with pressurised, fast-setting grout.

2.2.29. Additionally, if such fractures exist, they would already intercept the Alltami Book which is flowing over bedrock, and therefore such loss of flow would already be occurring as the condition would be enhanced by natural processes, and there would be a visible loss of flow from the watercourse; there is no evidence of this.

Paragraph 3.3.8 of the Applicant's HIA acknowledges that the exact relationship between surface water in the Alltami Brook and surrounding groundwater is not currently known in detail and proposes ground investigation at detailed design stage to address this and confirm the conceptual understanding. Until such ground investigations have been completed satisfactorily, NRW is unable to accept that the Applicant's conceptual model is an accurate representation of conditions at the Alltami Brook crossing point, for the reasons explained above.

NRW therefore maintains its position [REP1-071] that there is insufficient evidence provided to date by the Applicant to support its conclusions, and that accordingly there may be deterioration of the Wepre Brook waterbody as a result of the proposed open-cut crossing of Alltami Brook. This is because there is a risk that excavating bedrock for the proposed Alltami Brook open-cut crossing could create a pathway for surface water to be lost to the ground/contaminated mine workings; this could cause water courses to dry up downstream. As a result, the derogation provisions under Article 19 of the Water Environment (WFD) Regulations 2017 must be engaged.

Applicants Response

2.2.30. The Applicant has informed NRW on multiple occasions that an intrusive ground investigation (GI) at the Alltami Brook is currently not possible (due to land access issues). The Applicant notes that it had secured an access licence to carry out such

investigations but that this was withdrawn by the landowner (as they are entitled to do) shortly before the investigations were due to be undertaken.

2.2.31. The Applicant did intend to undertake GI at the Alltami Brook during the main phase of GI but was prevented from doing so due to land access issues. The Applicant considers that the work undertaken sufficiently establishes that the level of risk is low, and the risk of discernible loss of water occurring is low. The Applicant confirms that a GI will be undertaken to support the detailed design, which will investigate the geological and hydrogeological setting and the relationship between surface water and groundwater. The scope of the GI will be sufficient to characterise the site setting and will be proportionate to the identified level of risk.

2.2.32. The level of GI which would be required to provide the detail NRW are seeking is entirely disproportionate to the level of risk (as established in the HIA) that it is being sought to address. This would require an overly onerous investigation for a potential impact which is already low risk.

2.2.33. As set out in the Without Prejudice Water Framework Directive (WFD) Derogation Case for Alltami Brook Crossing submitted by the Applicant **[REP5-016]**, the Applicant considers that NRW are seeking an unreasonable degree of certainty to counter a merely hypothetical risk on this point.

2.2.34. The Applicant maintains its position that there is no mechanism present by which a discernible loss of flow could occur from the Alltami Brook to the underlying bedrock aquifer. NRW's position is based on a very unlikely scenario whereby there is a productive fracture present which is connected to a receptor capable of accepting a continuous large volume of flow i.e., unsaturated mine workings. NRW has provided no evidence to demonstrate why this is a realistic scenario, and in the Applicant's opinion, are asking the Applicant to undertake a complex investigation (and at a very early stage in the project) to disprove a hypothetical scenario based on a series of unlikely assumptions, which is clearly disproportionate given the level of risk. These are:

- That there will be an unsaturated feature (i.e., fracture) present in the base or the sides of the excavation. There is no evidence presented as to why this is likely.
- That such a feature (e.g., fracture) will be connected to a downstream receptor capable of accepting a large, continuous rate of flow. Again, no evidence has been presented to demonstrate why this is a likely scenario at this location. The Applicant has already stated previously why the mine workings do not represent a viable receptor:
    - The possibility of a productive fracture being present in the excavation which is directly connected to unsaturated mine voids is very unlikely.

  - The duration since abandonment means water levels within mine voids will have recovered to natural water levels, therefore they most likely are already saturated and not capable of accepting the volume of flow in question,
  - No evidence that mine open voids still exist – geophysics survey indicates the opposite,
  - No evidence of a mine adit outfall being present on the watercourse.
- That there are no sufficiently productive fractures currently in contact with the watercourse and accepting significant volumes of flow. If NRW's premise is correct, the watercourse should already be losing significant amount of flow to ground in current condition, as the condition would already be enhanced by natural processes. No evidence has so far been presented to demonstrate that this is the case, whereas The Applicant has presented evidence indicating the opposite is the case.
- That it would not be a localised fracture system which, in the event it is connected to the watercourse somehow, would not quickly fill up and stop being able to accept any more flow. NRW agree with the Applicant that fracture flow is laterally discontinuous, so it is unclear what the receptor of the flow would be.
- That the construction approach itself is not sufficient in preventing flow to or from the built structure; that grout injected into fractures buried underneath a concrete structure could be washed out when they will not be in direct contact with the watercourse.

2.2.35. Based on the above, NRW is asking the Applicant to disprove a very unlikely hypothetical scenario, and for which they have provided no evidence (e.g., case studies) as to why it is realistic as a scenario. In the Applicant's view, NRW is taking the position that the aquifers present have hydraulic properties which are representative of a chalk karst principal aquifer, i.e., which has regional fracture flow with large open fractures or conduits capable of accepting significant volumes of continuous flow and transporting it over larger distances to downstream receptors e.g., springs, similar to a disappearing stream/dry valley setting. This is not what is present at the Alltami Brook.

2.2.36. In summary, the Applicant agrees with NRW's position that there are uncertainties in the conceptual understanding. However, the Applicant considers that the evidence base is sufficiently robust to establish the level of risk. The Applicant does not agree with NRW's proposed scenario where a significant loss of flow would occur from the Alltami Brook to ground. Based on the lines of evidence, this is not congruent with the geological and hydrogeological conditions present at the site. In order for there to be a significant loss of flow, there needs to be a receptor present capable of accepting continuous flow in perpetuity. The bedrock aquifer underlying the Alltami Brook, an aquifer within which lateral flow is limited due to discontinuous

fractures, is not considered a viable receptor capable of receiving the continuous discharge required. It is highly likely that any such discharge directed into the bedrock from the river would cause the local fractures to be filled and would not be capable of receiving additional flow. Additionally, should such features be prevalent at the site, these would already be present within the watercourse and be receiving flow under current conditions. There is no evidence that this is occurring. Therefore, the scenario which NRW propose it not realistic and the risk of impacting WFD status of the Wepre Brook water body is not considered significant.

NRW also wishes to provide the following advice regarding the HIA:

- ***• Paragraph 1.7.5: Since the Alltami Brook is an Ordinary Watercourse the "appropriate consents/permits" for working in the channel would need to be sought from the Lead Local Flood Authority, not NRW as currently stated.***
- ***• Paragraph 2.8.1: We are unable to locate the permitted discharge activity from the landfill site mentioned, but we advise that there are discharges from quarries in the catchment upstream.***
- ***• Paragraph 3.3.3 explains that "Inspections will be undertaken following an intense rainfall event or heatwave to monitor any damage and implement appropriate mitigation as necessary." NRW advises that clarification is provided about how this would be achieved in practice during/following such events. We also advise that clarity is provided about how any integrity loss underneath the concrete slab would be identified and whether the walls of the excavation (which we understand could be up to 4m deep) would also be grouted in addition to the base.***
- ***• Paragraph 3.3.9: The seasonal variation described would also need to be considered once the ground investigation data become available and the investigations should be planned to ensure that this seasonal variation can be assessed.***

Applicants Response

2.2.37. Bullet point 1 – acknowledged and agreed. Bullet point 2 – acknowledged.

2.2.38. Bullet point 3 – A visual inspection would be undertaken to assess if there is any degradation/washing away of the reinstated riverbed. Integrity loss beneath the concrete slab is not considered a realistic scenario – any grouted fractures would be buried in concrete and not in contact with the watercourse, and the fractures themselves would be filled with grout. Any features in the sides of the excavation would be grouted as well as those in the base.

2.2.39. Bullet point 4 - The Applicant confirms that a GI will be undertaken to support the detailed design, which will investigate the geological and hydrogeological setting and the relationship between surface water and groundwater. The scope of the GI

will be sufficient to characterise the site setting and will be proportionate to the identified level of risk..

2.3. APPLICANT RESPONSE TO ANNEX B: NRW'S RESPONSES TO THE APPLICANT'S COMMENTS ON SUBMISSIONS RECEIVED AT DEADLINE 4 [REP5-015] AND RESPONSES TO EXAMINING AUTHORITY'S SECOND WRITTEN QUESTIONS (EXQ2) [REP5-025] (WITH REGARDS TO NRW'S FLOOD RISK MANAGEMENT ASSETS)

The Applicant's response to NRW's Deadline 4 submission [REP5-015] and its Responses to Examining Authority's Second Written Questions (ExQ2) [REP5- 025] did not resolve NRW's concerns regarding securing access to its flood risk management assets. The Applicant suggests that the discussion 'has become somewhat sidetracked into powers of entry and especially the emergency powers'. The Applicant also suggests that NRW does not adopt 'a credible position.' NRW disagrees. As made clear, NRW has powers to enter land to discharge its functions in respect of flood risk management. These powers may be exercised whether or not there is a physical impediment. NRW's concern therefore is to ensure that, as a matter of project design, there is no physical impediment to its powers of entry so as to avoid potential enforcement action being taken. Put simply, this can be averted by the inclusion of explicit provisions in the DCO requiring NRW's approval as to the siting of the construction compounds. The Applicant has specified that it 'has no construction compounds located so as to prevent access to flood defences.' Whereas NRW welcomes this confirmation, the design can be subject to change following the grant of the DCO. Nevertheless, given the Applicant's assurances at this stage that there will be no physical impediment to NRW accessing its flood risk assets, its concerns regarding NRW's requests being too onerous or unreasonable, respectfully fall away. Accordingly, NRW maintains its position as set out in its previous submissions that the protective provisions are not suitable and that explicit reference to NRW's consent being required in respect of consenting to the siting of any construction compounds or other structure that may compromise access should be referenced either in the CEMP or by way of a stand-alone DCO requirement.

In order to clearly explain the nature of NRW's concerns regarding access to its flood risk management assets NRW prepared illustrative plans demonstrating the issues in relation to access. These were provided to the Applicant and a meeting was held to discuss the issue on 17/07/23. During the meeting it was confirmed by the Applicant that the northern access track (red line on Figure 1 below) would not be fenced off during the construction period and that this was already secured within the draft DCO. It was also confirmed that there would be no impediment to NRW access along the southern access track during the works (red line on Figure 2 below). At this

meeting, the Applicant agreed to confirm this position and amend the draft DCO to guarantee that this is ensured. On that basis, subject to suitable provisions being incorporated into the draft DCO as set out above NRW considers that its concerns regarding access to its flood risk management assets could be satisfactorily resolved.

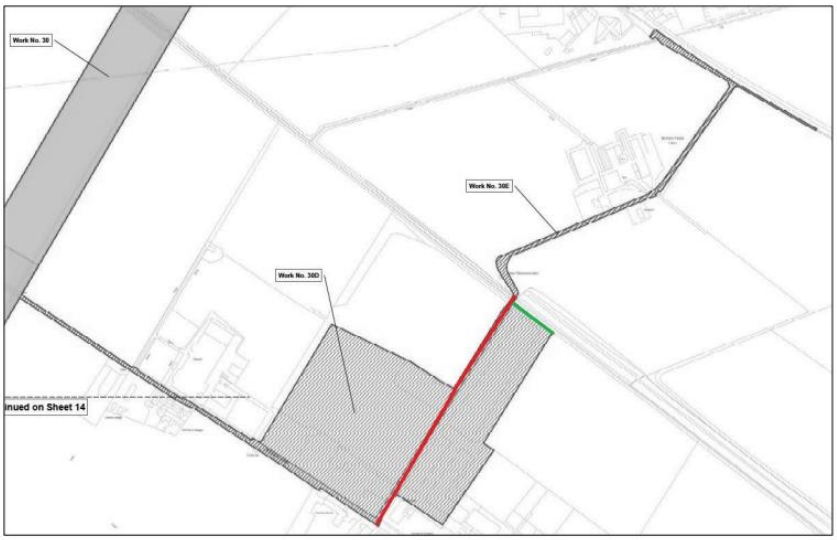

Figure 1: Compound 30D

The red line above shows the access road that NRW uses to get down to the Northern Embankment. The compound spans the road so it is not clear whether the access point would be fenced off. It needs to be ensured that there is unrestricted access along this road. The green line shows the section of the compound directly adjacent to Sealand Main Drain (a main river). If the fencing extends to this location, NRW would be unable to track a machine along the bank for maintenance purposes. This work would also be subject to a Flood Risk Activity Permit.

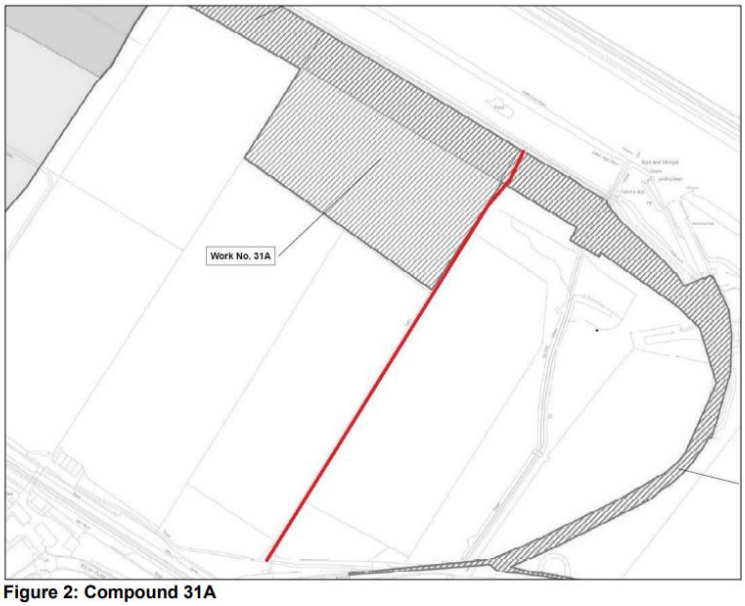

Figure 2: Compound 31A

The red line above shows NRW's only access point to the Hawarden Embankment at this location. It needs to be ensured that there are adequate access provisions for an excavator with flail to get on to the crest of the embankment. There are also key flood risk structures here (Beeches Drain outfall) that can only be accessed at this point. It needs to be ensured that the compound layout does not prohibit access and any fencing is adequately offset from the access track so that this remains free from any obstructions.

Applicants Response

2.3.1. The Applicant has reviewed the information set out. The access right sought by the Applicant over the route to the north of the River Dee is a non-exclusive right of temporary possession. The access plans show that no full closure is proposed on this route. The Applicant has not sought any powers to fully close this route within the DCO, however it is likely repairs and improvements to the surface will be required before and after its use as a construction route meaning that areas will be subject to works (pothole filling and repair and similar minor surface works). The Applicant is happy to add a provision specifying that not only will this access be maintained, but the compound use (compound 30D) will not interfere the width of access required. The Applicant will provide small, temporary diversions into the adjacent land plots during any works to the access route where this is necessary in order to maintain access across the route as a whole.

The access route to the south of the River Dee was unidentified as the Applicant had understood access was taken over the track further to the east. It is helpful that this has been clarified. The Applicant is happy to commit to maintaining the current access (adjacent to compound 31A and perpendicularly over the Applicant's access route) open for use by NRW, including access across the route of the Applicant's access. Again, there may need to be some minor works in plot 14-14a (such as pothole repair) but they would be designed so that the access was not blocked.

2.3.2. The Applicant has proposed alternative wording securing the above to NRW and awaits their comments.