

## MARINE LICENCE APPLICATION

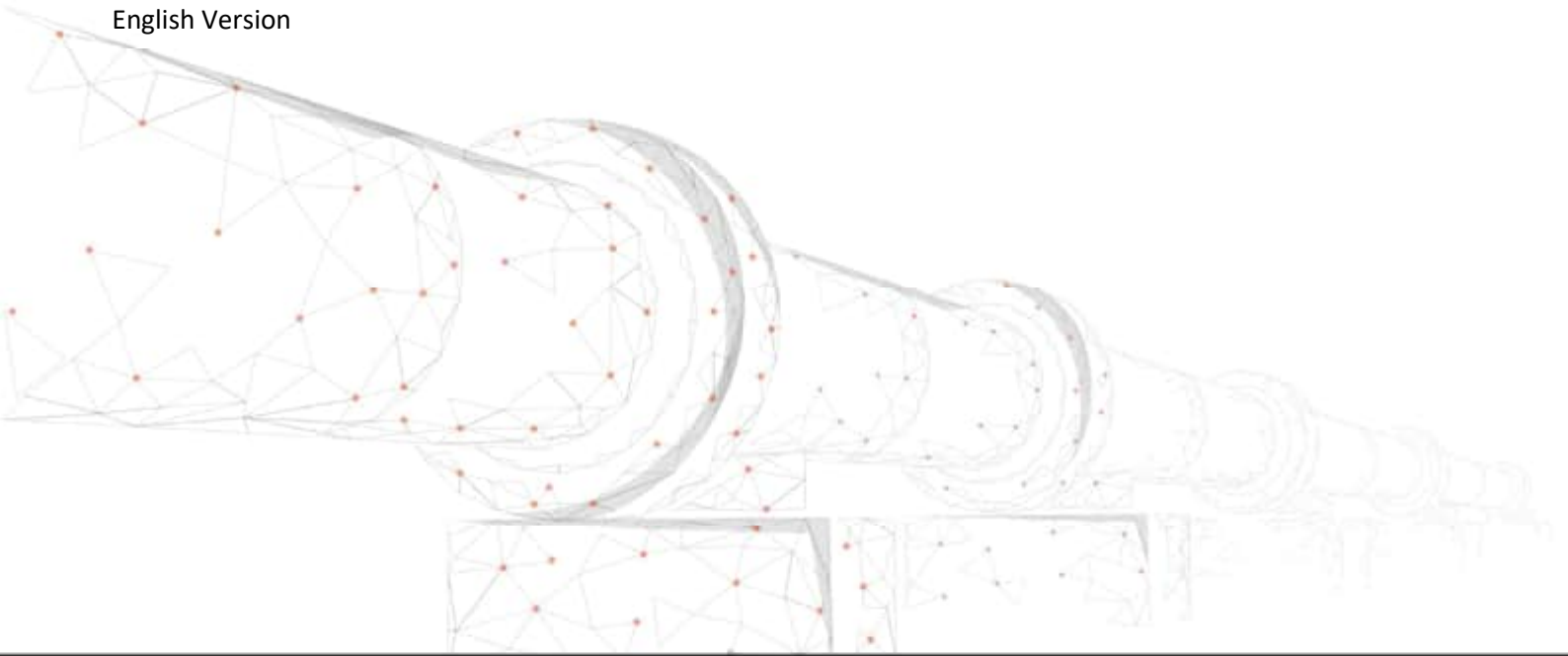
### Environment Report

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

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

Applicant: Liverpool Bay CCS Limited

English Version



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# 1. INTRODUCTION

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## 1.1. PROJECT BACKGROUND

- 1.1.1. This **Environment Report** has been prepared in support of the Marine Licence application by Liverpool Bay CCS Limited (the 'Applicant'), for the trenchless crossing of the River Dee (the Proposed Development), by the newbuild carbon dioxide pipeline, below Mean High Water Springs (MHWS). These works are also included in the Environmental Statement (ES) for the HyNet Carbon Dioxide Pipeline Development Consent Order (DCO) Application, as they form part of that larger project.
- 1.1.2. The Marine Licence is required for the marine licensable activities associated with the Proposed Development. These licensable activities relate only to those elements that will be carried out and installed below Mean High Water Springs (MHWS). For the Proposed Development this would be the approximately 75 m in length bored section of pipe installed below the River Dee between the MHWS mark on each bank. However, for completeness, and context, the works required for the entry and exit pits, and the whole length of the pipe connection between them, have been described in this section. This is because the anticipated environmental effects of the Proposed Development are intrinsically linked to these connected activities. Further details on the Proposed Development are provided in **Section 2**.
- 1.1.3. Under Reg 10(1)(b) of the Marine Works Regulations, Natural Resources Wales-Marine Licencing Team (NRW-MLT) informed the Applicant that it has determined (**Ref: PA2301, 21-Feb-2023**) that an EIA is not required for the purposes of determining the Marine Licence application. This is because it is satisfied that an assessment of any effects on the environment of the Proposed Development is being carried out by another consenting authority, the Planning Inspectorate (PINS), and the assessment will be sufficient to meet the requirements of the EIA Directive in relation to that Proposed Development.
- 1.1.4. NRW-MLT has therefore confirmed (**Ref: PA2301, 21-Feb-2023**) its intent to defer an EIA consent decision under the Marine Works Regulations, in accordance with Regulation 10(1)(b), on the basis that an assessment of any effects on the environment of the Proposed Development, subject to this Marine Licence application, is being carried out by the Secretary of State as part of the determination process for a DCO under the Planning Act and that this will be sufficient to meet the requirements of the EIA Directive. The PINS reference for the DCO under consideration for the proposed HyNet Carbon Dioxide Pipeline DCO is EN070007, and the application documentation can be found at the following location:  
<https://infrastructure.planninginspectorate.gov.uk/projects/wales/hynet-carbon-dioxide-pipeline/?ipcsection=docs>

- 1.1.5. Under Regulations 10 (1)(b) and 10 (4)(a) of the Marine Works Regulations (as amended) NRW cannot determine the marine licence application until it is satisfied that to do so would be sufficient to meet the requirements of the EIA Directive and be compatible with the measures identified by the Secretary of State to ensure compliance with the EIA Directive. Therefore, in these circumstances, the Applicant understands that a marine licence for the Proposed Development can only be legally granted after the completion of the consideration of the EIA and associated decision made by the Secretary of State.
- 1.1.6. The Environmental Statement (ES) submitted in support of the HyNet Carbon Dioxide Pipeline DCO Application covers all environmental topics, as they relate to the whole project, including the trenchless crossing of the River Dee.
- 1.1.7. This **Environment Report** covers only those topics that have been identified to have a potentially significant effect within the River Dee from the marine licensable activities for the trenchless crossing below MHWS.
- 1.1.8. This **Environment Report** therefore presents an assessment to identify the likely significant effects arising from the installation of the pipeline underneath the River Dee below MHWS, in support of a Marine Licence application for the Proposed Development.
- 1.1.9. **Section 3** provides details of the scope of the assessments presented in this **Environment Report**.

## 1.2. PURPOSE OF THIS REPORT

- 1.2.1. The trenchless crossing of the River Dee forms part of a larger project, included in the HyNet Carbon Dioxide Pipeline DCO Application. The DCO Application included an ES, which includes an assessment of the trenchless crossing of the River Dee. This **Environment Report**, therefore, draws together the environmental information relevant to the Marine Licensable activities included within the Marine Licence application for the trenchless crossing of the River Dee below MHWS.
- 1.2.2. This **Environment Report** has been produced to describe and summarise the environmental baseline and environmental assessments undertaken to support the Marine Licence application for the Proposed Development.
- 1.2.3. Together with the accompanying **Habitats Regulations Assessment - Information to Inform an Appropriate Assessment (HRA)**, and **Water Framework Directive Assessment (WFDa)**, this **Environment Report**, provides the relevant environmental information to aid NRW's decision making on the Marine Licence application for the Proposed Development.

## 1.3. POLICY BACKGROUND

### MARINE POLICY STATEMENT

- 1.3.1. Published in 2011, the UK Marine Policy Statement (MPS), under Section 44 of the Marine and Coastal Access Act (MCAA) 2009, provides the framework for marine spatial planning, specifically for the preparation of Marine Plans and to ensure marine resources are utilised in a sustainable way (Defra, 2011). The MPS was jointly adopted by the Secretary of State, Welsh Minister, Scottish Ministers and the Department of the Environment in Northern Ireland to promote successful collaboration opportunities.
- 1.3.2. The MPS states that Marine Plans should consider and identify the specific areas of potential related to the deployment of various renewable energy technologies, to help improve the UK's energy security. Additionally, the MCAA 2009 requires that all public authorities taking authorisation and/or enforcement decisions that affect or have the potential to affect the UK marine area, to do so in accordance with the MPS and relevant Marine Plans.

### WELSH NATIONAL MARINE PLAN

- 1.3.3. The Welsh National Marine Plan (WNMP) was published in November 2019 (**Welsh Government, 2019c**), introducing a framework to support sustainable decision making within the marine environment. Policies within the WNMP are specific to the renewable energy sector.
- 1.3.4. The WNMP represents the planning process to shape Wales' seas to support economic, social, environmental, and cultural objectives. The purpose of the WNMP is to guide the sustainable development of Wales' marine area by setting out how proposals will be considered to decision makers. Pertaining to the Welsh inshore region (out to 12 nautical miles (nm)) and the offshore region (12 to 200 nm), the WNMP sets out four key objectives in achieving an increasingly sustainable marine economy, including:
- contribute to a thriving Welsh economy by encouraging economically productive activities and profitable and sustainable businesses that create long-term employment at all skill levels;
  - support the opportunity to sustainably develop marine renewable energy resources with the right development in the right place, helping to achieve the UK's energy security and carbon reduction objectives, whilst fully considering other's interests, and ecosystem resilience;
  - provide space to support existing and future sustainable economic activity through managing multiple uses, encouraging the coexistence of compatible activities, the mitigation of conflicts between users and, where possible, by reducing the displacement of existing activities; and
  - recognise the significant value of coastal tourism and recreation to the Welsh economy and well-being and ensure such activity and potential for future growth are appropriately safeguarded.

- 1.3.5. When assessing Marine Licence applications in Wales the Regulator, NRW, must determine whether the activities of the Proposed Development are compatible with the objectives of the relevant marine plan. An evaluation of the trenchless crossing of the River Dee against the policies within the Welsh National Marine Plan, using a template provided by NRW-MLT, is presented as **Attachment 4(d)(1)** to the Marine Licence Application Form.

### **MARINE AND COASTAL ACCESS ACT**

- 1.3.6. The Marine and Coastal Access Act 2009 states that a Marine Licence is required for certain activities carried out within the UK marine area. Construction activities occurring below Mean High Water Springs (MHWS) will typically require a Marine Licence from the Marine Management Organisation (MMO).
- 1.3.7. This **Environment Report**, and the accompanying **WFDa**, and **HRA**, have been prepared in support of the Marine Licence application for the Proposed Development

### **HABITATS REGULATIONS ASSESSMENT**

- 1.3.8. Given the proximity of the Proposed Development to several Habitats sites, including the Dee Estuary Special Protection Area / Special Conservation Area, an **HRA** report has been prepared. This provides NRW-MLT and stakeholders with sufficient information to decide whether the Proposed Development will lead to Likely Significant Effects (LSE) on one or more Habitats site(s). Where LSE are identified, the detailed assessment will provide NRW-MLT with sufficient information to assess whether the Proposed Development either in isolation and / or in-combination with other plans or projects could result in adverse effects on the integrity of relevant protected Habitats sites.
- 1.3.9. Whilst the over-arching objectives of EIA and HRA are similar, their legislative basis, and scope, their level of detail and terminology vary. As such, these processes have been undertaken separately. However, the scope presented within this **Environment Report** has been developed to ensure that the needs of both these processes have been considered to ensure a coordinated assessment.
- 1.3.10. Notwithstanding, an **HRA** has been included with the Marine Licence Application, and a summary of the key findings is presented in **Section 9**.

### **WATER FRAMEWORK DIRECTIVE ASSESSMENT**

- 1.3.11. The **WFDa** has been included with the Marine Licence Application. The **WFDa** has screened for both the potential construction and operational impacts of the Proposed Development upon WFD water bodies. These water bodies include main rivers, canals, ordinary watercourses, transitional waterbodies and objectives from the North West and Dee River Basin Management Plans and groundwater resources. This includes identifying likely risks to biodiversity, the

biological, physico-chemical and hydromorphological quality of WFD water bodies (including River Dee), nearby ordinary watercourses and groundwater quality, and the likely ability of good-practice methods to manage risks associated with pollutants typically experienced during the construction and operational phase.

- 1.3.12. A summary of the key findings of the **WFDa** is presented in **Section 10**.

## 2. PROPOSED DEVELOPMENT

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### 2.1. OVERVIEW

- 2.1.1. The pipeline crossing of the River Dee will be carried out using a trenchless crossing technique, either Horizontal Directional Drilling (HDD) or micro-tunnelling. The trenchless crossing of the River Dee has been proposed to prevent disruption to the River Dee (Afon Dyfrdwy).
- 2.1.2. For both trenchless techniques the following parameters would apply:
- The entry and exit pits for the trenchless crossing will be sited a minimum of 16m away from the transitional (tidal) waters (and any defence structures on that watercourse).
  - The compounds for the entrance and exit pits for micro-tunnelling would be approximately 30x30m and 20x20m.
  - The compounds for the entrance and exit pits for HDD would be approximately 50x50m and 30x30m.
  - The trenchless crossing depth below riverbed would be a minimum of 8m for micro-tunnelling, and a minimum of 15m for HDD.
  - Up to four weeks working for both micro-tunnelling and for HDD.
- 2.1.3. The marine licensable activities associated with the Proposed Development relate only to those elements that will be carried out and installed below Mean High Water Springs (MHWS). For the Proposed Development this would be the approximately 75 m in length bored section of pipe installed below the riverbed between the MHWS mark on each bank.
- 2.1.4. However, for completeness, and context, the works required for the entry and exit pits, and the whole length of the pipe connection between them, have been described in this section. This is because the bored section of pipe installed below MHWS will be carried out by plant and equipment that will be remote from the marine licensable activities, as described in **Section 2.1.1**. Therefore, the anticipated effects of the Proposed Development on the designated sites are intrinsically linked to these connected activities e.g. from noise generated by tunnel boring plant and equipment.
- 2.1.5. For the trenchless crossing of the River Dee, the following sections provide a description of the activities related to

### 2.2. CONSTRUCTION STAGE

#### TRENCHLESS CROSSINGS

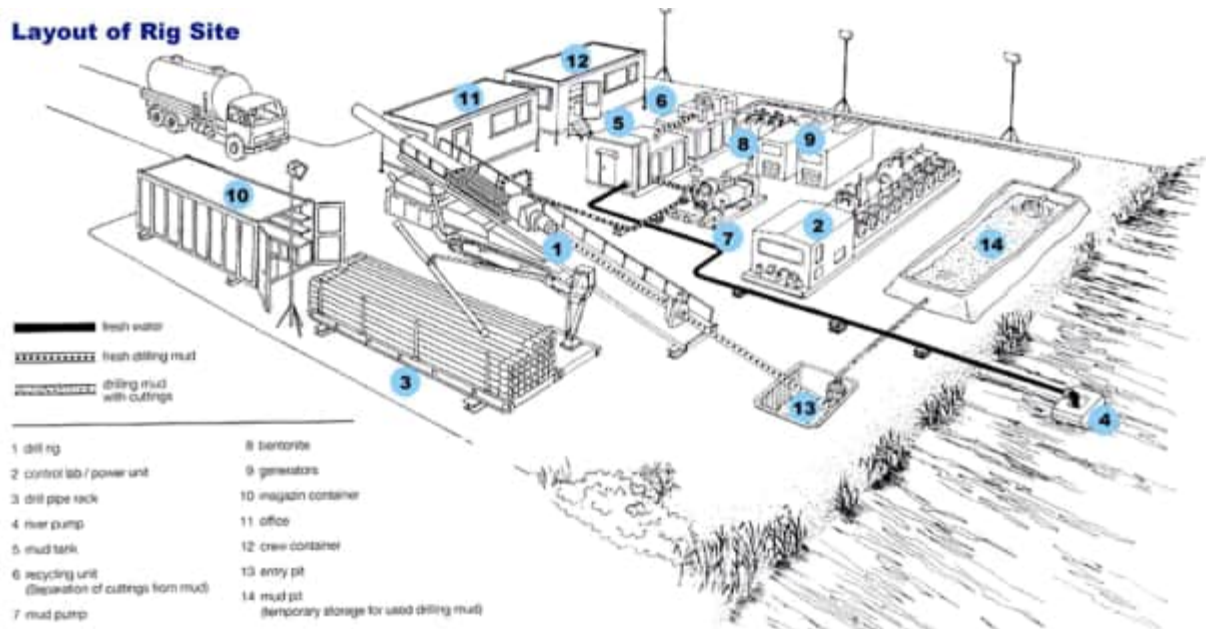
- 2.2.1. The Proposed Development will be laid beneath the River Dee watercourse via trenchless crossing techniques. These techniques use a machine to drill or 'bore' a hole through the ground from one side of a specific feature (for example, major roads) to the other. Typically, a pit is dug at either end of the

trenchless section where the machinery will be located, creating an entrance and exit pit. All entrance and exit pits will be returned to original use following completion of the construction process.

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

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

2.2.4. **The HDD process** starts by setting up the 'Rig Site' and the 'Pipe Site' as shown in **Figure 2-1** and **Figure 2-2** respectively. The entrance pit (Rig Site) comprises a 50 m x 50 m drill site for the launch pit, and an exit pit (Pipe Site) a 30 m x 30 m, both of which would require road access to transport the drilling equipment. HDD is generally accomplished in three principal phases. First, a small diameter pilot hole is drilled along a directional path from one surface point to another. Next, the bore created during pilot hole drilling is enlarged to a diameter that will facilitate installation of the desired pipeline. Lastly, the pipeline is pulled into the enlarged hole, thus creating a continuous segment of pipe underground exposed only at the two initial endpoints. The entrance and exit pits would be backfilled and re-instated upon completion. An illustration of the HDD technique is shown in **Figure 2-3**.



**Figure 2--1: Potential layout for rig site for HDD**

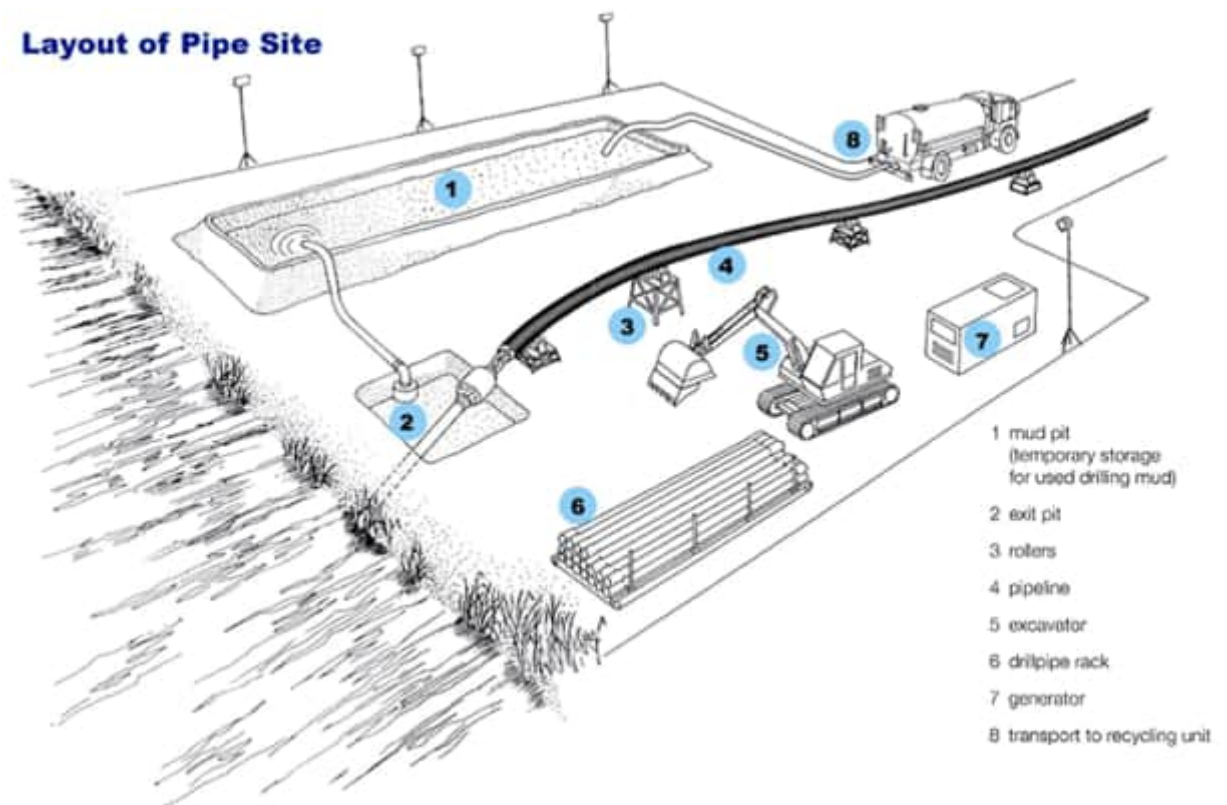


Figure 2--2: Potential layout for pipe site for HDD

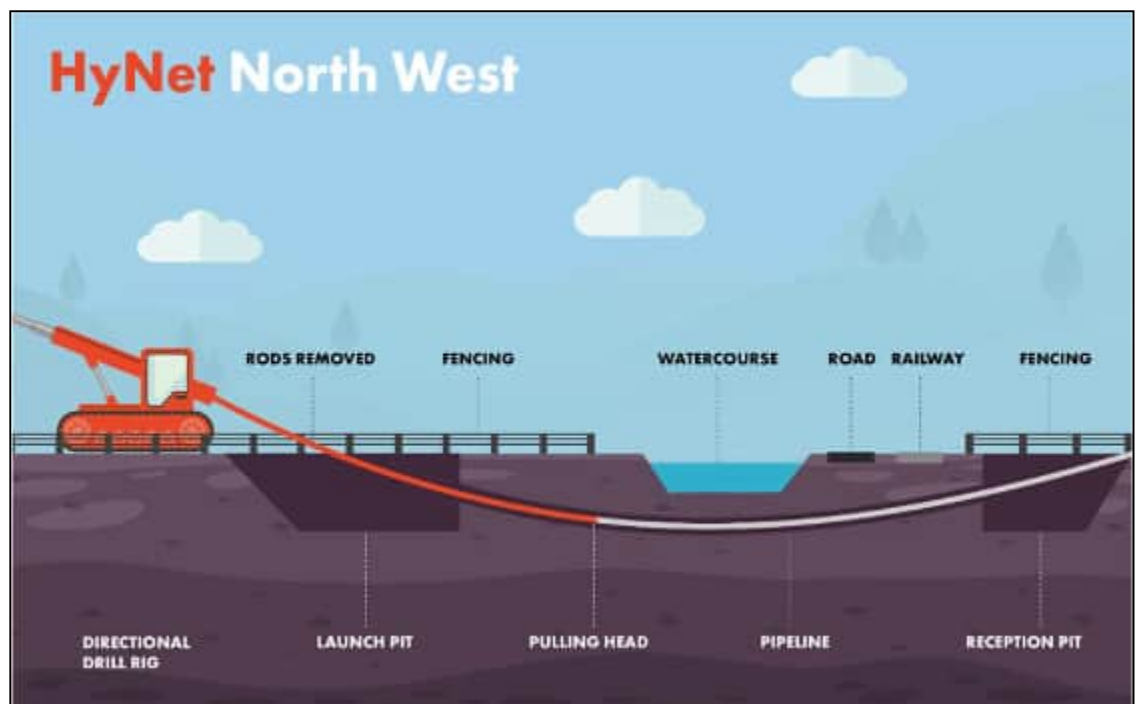
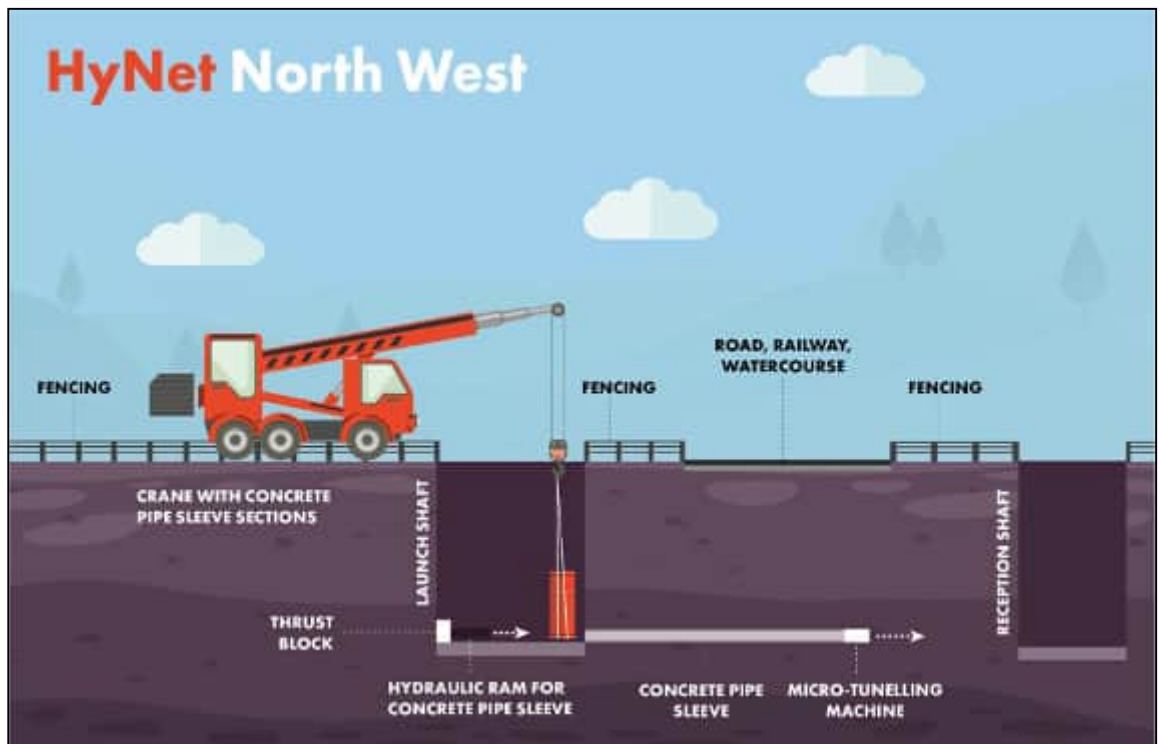


Figure 2-3: Illustrative cross-section of typical HDD technique

- 2.2.5. The drilling process generally starts with the creation of the receiving hole at the Pipe Site, and entrance pit in the Rig Site. These pits will allow the drilling fluid to be collected and reclaimed to and prevent waste. The first stage drills a pilot hole on the designed path, and the second stage (reaming) enlarges the hole by passing a larger cutting tool known as the back reamer. The diameter of the reamer depends on the size of the pipe to be pulled back through the bore hole. The driller increases the diameter according to the outer diameter of the conduit and to achieve optimal production. The third stage places the product or casing pipe in the enlarged hole by way of the drill stem; it is pulled behind the reamer to allow the pipe to be centred in the newly reamed path. Depending on the ground conditions the HDD process would take approximately four weeks working to complete.
- 2.2.6. HDD uses bentonite, a clay-based drilling fluid which mixes with drill cuttings arisings to form a slurry. The used slurry is pumped back to the drill launch area where it is filtered and recirculated once again. Once the crossing has been completed, the bentonite will be disposed of appropriately.
- 2.2.7. **The micro-tunnelling process** starts by setting up the Entrance Shaft site and the Exit Shaft site as shown in **Figure 2-4**. The Entrance Shaft site would be approximately 30 m x 30 m, and the Exit Shaft site around 20 m x 20 m, both of which would require road access to transport the drilling equipment.



**Figure 2-4: Illustrative cross-section of typical micro-tunnelling technique**

- 2.2.8. Entrance and exit shafts are constructed at each end of the tunnel by trench box, sheet piling or sacrificial concrete rings. The Entrance Shaft would be

approximately 8m in depth, and the Exit Shaft approximately 5m. The Entrance and Exit Shafts would be backfilled and re-instated upon completion.

- 2.2.9. An unmanned Micro-tunnel Boring Machine is used to install a reinforced concrete carrier pipe between the two shafts, Pipeline sections are threaded through the carrier pipe and welded in after tunnelling activities have completed. The tunnel is then fully grouted, and the shaft construction removed and backfilled. A minimum depth of 8m (distance between the top of the casing and the riverbed) would be maintained along the length of the crossing. Micro-tunnelling uses bentonite as a drilling fluid.
- 2.2.10. Depending on the ground conditions the Micro-tunnelling process would take approximately four weeks working to complete.

#### **Activity Programme and Working Hours**

- 2.2.11. The outline construction phasing of works is anticipated to be as follows:
- 2.2.12. Core working hours are proposed to be from 08.00 to 18.00 on weekdays (excluding bank holidays). To maximise productivity within core working hours, the Construction Contractor(s) will require a period of up to one hour before and up to one hour after core working hours for the start-up and close-down of activities. This will include, but not be limited to, deliveries, movement to place of work, unloading, maintenance and general preparation works. It will not include the operation of any plant or machinery likely to cause disturbance to local residents or businesses. These periods will not be considered an extension of core working hours.
- 2.2.13. Core working hours may vary for the trenchless crossings according to the length of the pipe being installed, ground conditions, and the technique used. In such cases, continual 24-hour working may be required to allow the tunnelling activities to be completed as safely and quickly as possible. The duration of 24-hour working at the long River Dee crossing, if the ground conditions prove difficult, is expected to last up to four weeks. Lighting is anticipated to facilitate night works for both trenchless techniques, most notably in relation to 24-hour working.

#### **Vegetation Clearance**

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

#### **Temporary Construction Compounds**

- 2.2.15. Temporary Construction Compounds to accommodate construction works are expected to be set out adjacent to the River Dee, but at least 16m from the transitional waters. These will be lit, as required, during normal working hours.

### **Hydrostatic Testing**

- 2.2.16. Following installation of the Proposed Development, pre-commissioning activities of the pipeline system would determine the structural integrity of the pipeline.
- 2.2.17. The pipeline will be cleaned and gauged to remove construction debris and check that the tested section is free of deformations or obstructions. Hydrostatic testing will then be undertaken. This involves filling the pipeline in sections with water which is then pressurised to test the line for leaks.
- 2.2.18. The source of the water will be from either a commercial standpipe, water tanker, new water abstraction or, where practicable, water re-used from previously tested sections to reduce the total water use.
- 2.2.19. The total expected volume of water required for hydrostatic testing is approximately 720m<sup>3</sup> of water per kilometre of pipeline.
- 2.2.20. Following hydrostatic testing, the water will be quality tested, then discharged to either a designated watercourse, public sewer via a temporary surface water pipe, or taken by road tanker to an offsite registered disposal site. The viability of each discharge option will be assessed at various locations along the pipeline route and relevant discharge licences obtained.
- 2.2.21. The pipeline will then be dried by using super dry air, nitrogen or by vacuum drying. The pipeline will then be pressured by super dry air or nitrogen and maintained at this pressure until commissioning.

### **Outline Construction Environmental Management Plan and Register of Environmental Actions and Commitments**

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

## **2.3. OPERATION STAGE**

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

## **2.4. DECOMMISSIONING ACTIVITIES**

- 2.4.1. The Proposed Development is permanent, but its useful life is linked to the capacity of the offshore reservoirs, where the carbon dioxide will be transported for permanent geological storage. The Proposed Development is designed to a life span of 25 years. When the Proposed Development ceases to be operational and reaches the end of its useful life, it will be decommissioned safely, filled with nitrogen, and left in-situ. The basis of assessment for operational life in the HRA is 25 years, which reflects the anticipated time by which the geological storage site will reach capacity.
- 2.4.2. During the decommissioning stage there will be a Decommissioning Environmental Management Plan (DEMP) adopted (**REAC** entry **D-BD-065**), which would control potential impacts similar to those which may occur during the Construction Stage.

## 3. ENVIRONMENTAL ASSESSMENT METHODOLOGY

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### 3.1. OVERVIEW

- 3.1.1. The EIA for the HyNet Carbon Dioxide Pipeline DCO Application was undertaken in accordance with the relevant regulations, followed applicable industry guidance and best practice, and has been undertaken by a suitably qualified project team. A similar approach has been carried out to prepare this **Environment Report**.
- 3.1.2. Consultation and engagement have played a critical role in ensuring that the scope of the EIA was agreed upon with all relevant stakeholders. The Applicant set out the proposed scope of the EIA for the HyNet Carbon Dioxide Pipeline DCO Application in a Scoping Report which was submitted to the Planning Inspectorate in June 2021. The Planning Inspectorate consulted with organisations, such as the Environment Agency and Natural Resources Wales, and returned their scoping opinion in July 2021 which confirmed the scope of the EIA. The assessment described in this **Environment Report** draws on the findings of the for the HyNet Carbon Dioxide Pipeline DCO Application ES. As they relate to the Proposed Development, and therefore reflects that scoping opinion.
- 3.1.3. The Applicant consulted on a Preliminary Environmental Information Report (PEIR) for the HyNet Carbon Dioxide Pipeline DCO Application between February and March 2022. This provided stakeholders and the public an opportunity to comment on the initial findings of the EIA. Ongoing engagement with a wide range of stakeholders continued throughout the EIA for the HyNet Carbon Dioxide Pipeline DCO Application to obtain information, discuss assessment methods and provide early sight of findings for comment. This **Environment Report** draws on the findings of the stakeholder engagement.
- 3.1.4. Data on the existing environment was collected via a range of methods, including extensive site surveys, desktop research and consultation with various organisations. This allowed an understanding of what aspects of the existing environment may be impacted by the Proposed Development, known as 'receptors'.
- 3.1.5. The assessments presented in this **Environment Report**, which draw on the ES for the HyNet Carbon Dioxide Pipeline DCO Application, consider what likely impacts the Proposed Development would have on the existing environment by following relevant guidance, industry best practice and professional judgement. Mitigation measures have subsequently been proposed to avoid or otherwise reduce the potential effects. This includes incorporating measures into the design of the Proposed Development, as well as identifying further measures which will be implemented during later stages, such as construction or operation.

- 3.1.6. This **Environment Report**, **HRA**, and **WFDa** also consider where multiple impacts may affect the same receptor at the same time, resulting in either combined effects (where they are due to different impacts from the proposed development) or cumulative effects (where they are due to impacts from the Proposed Development and other developments).
- 3.1.7. Where this **Environment Report** presents likely environmental effects following the consideration of mitigation, these are known as ‘residual’ effects and have been summarised for each environmental topic in **Sections 4 to 7**.
- 3.1.8. The final design will be developed by the appointed construction contractor, following the granting of the DCO for the HyNet Carbon Dioxide Pipeline, and the Marine Licence for the Proposed Development. This includes, for example, specifying the exact alignment of the new pipeline within the 100m corridor and the method of trenchless crossing. Therefore, where specific details are not known, the **Environment Report** considers reasonable worst-case assumptions to ensure that the assessment is robust and that likely significant effects are identified and accordingly mitigated.

## **3.2. ELEMENTS SCOPED OUT OF THE ASSESSMENT**

- 3.2.1. As reported in **paragraph 1.1.4**, NRW-MLT is the assessment of any effects on the environment of the Proposed Development, subject to the Marine Licence application, to the Secretary of State as part of the determination process for the HyNet Carbon Dioxide Pipeline DCO. This **Environment Report**, and the supporting **HRA**, and **WFDa**, therefore, draw together the relevant environmental information to aid NRW-MLT’s decision making on the Marine Licence application.
- 3.2.2. Given the position by NRW-MLT, the scope of this **Environment Report** has been further rationalised from the assessment presented in the ES for the HyNet Carbon Dioxide Pipeline DCO. This is because many of the environmental elements and receptors affected by the wider HyNet Carbon Dioxide Pipeline DCO development, will not be affected by the trenchless crossing of the River Dee. The findings of this scoping exercise are presented in **Table 3.1** and **Table 3.2**.
- 3.2.3. The elements shown in **Table 3.1** are not considered to give rise to likely significant effects, and no source-pathway-receptor linkages have been identified as a result of the Proposed Development. The topics identified in **Table 3.1** have therefore been omitted from this assessment. These elements will not be discussed or assessed further in this **Environment Report**. Justification for scoping out these elements is presented in **Table 3.1**.

**Table 3.1 – Elements Scoped Out of the Assessment**

| Element Scoped Out | Justification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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| <b>Air quality</b> | <p><b>Construction phase</b></p> <ul style="list-style-type: none"> <li>The assessment of construction impacts on air quality typically addresses the potential for impacts from dust on nearby sensitive receptors. As the Proposed Development relates to the construction of a trenchless crossing tunnel bore, there is no potential for dust impacts from the marine licensable activities, as they will be below ground.</li> <li>The main sources of dust will be from the ground preparation for the drilling rig, and pipe sites required for the installation of the Proposed Development tunnel bore (see <b>Figure 2--1</b>, <b>Figure 2--2</b>, and <b>Figure 2-4</b>).</li> <li>The entrance/exit pits will be situated at least 16m from the riverbank for both methods of installation. Trenching on the approach to the entrance/exit pits would, however, be achieved through open-cut techniques. Given that impacts as a result of dust are generally realised within approximately 50m of the source, dust generated as a result of construction activities within 50m of the River Dee could give rise to adverse effects. This is because high levels of dust deposition could result in the smothering of vegetation/habitats or a deterioration in water quality of the river. However, as reported in the <b>HRA</b>, following the implementation of the dust control measures identified in the <b>REAC</b>, and <b>OCEMP</b> there would be no adverse effects on sensitive environmental receptors as a result of emissions or deposition of dust.</li> <li>Dust arising from track out from vehicle movements is likely to be <b>low</b>. This is because, there will be fewer than 10 HDVs per day over unpaved ground for a distance 50 to 100m. Following IAQM guidance<sup>1</sup>, the dust emission magnitude for track out in this situation would be <b>small</b>. Although the sensitivity of the ecological receptors is <b>high</b>, the resultant rating of potential dust impacts from track out is <b>low risk</b>.</li> <li>Potential for odour risk given the nature of the Proposed Development and its short duration of up to four weeks, would be <b>negligible</b>.</li> </ul> <p><b>Operation and maintenance phase</b></p> <ul style="list-style-type: none"> <li>There are no sources of atmospheric emissions during the operation of the Proposed Development. No pipeline inspection gauges (PIGs) or venting are planned for the Proposed Development project at this location. Therefore, consideration of the impact of this source of dust and air quality is not required,</li> </ul> |

<sup>1</sup> Institute of Air Quality Management (IAQM), 2014: Guidance on the assessment of dust from demolition and construction. Version 1.1.

| Element Scoped Out | Justification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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|                    | <p>as routine maintenance events and operations will be carried out at locations remote from the Proposed Development.</p> <ul style="list-style-type: none"> <li>The operation of the Proposed Development will not result in any increases in traffic flow or changes to traffic composition, and consequently will have no likely significant effect on air quality.</li> </ul> <p><b>Decommissioning phase</b></p> <ul style="list-style-type: none"> <li>When it reaches the end of its useful life the Proposed Development will be flushed and cleaned at locations remote from the river Dee. The Proposed Development will then be decommissioned safely, filled with nitrogen, and left in situ.</li> <li><b>No likely significant effects arising from dust and air quality have been identified during the design of the Proposed Development within the construction, operation and maintenance, and decommissioning phases. This topic has therefore been scoped out from further assessment of these phases.</b></li> </ul>                                                                                                                                                                                                                                                                    |
| Climate resilience | <p><b>Construction, operation and maintenance, and decommissioning phases.</b></p> <ul style="list-style-type: none"> <li>An assessment of the construction, operation, and decommissioning effects on climate resilience has been scoped out. The scoping out has been based on the following considerations; <ul style="list-style-type: none"> <li>The trenchless crossing depth below riverbed would be a minimum of 8m. The design of pipeline infrastructure will be to appropriate engineering and safety standards taking into account anticipated climatic changes for this location. The pipeline will be all underground with minimal vulnerability to climatic change over the lifetime of the Proposed Development.</li> <li>Construction of the Proposed Development will be completed within around four weeks, which is too short a time frame to experience vulnerability to climate change.</li> <li>Over the lifetime of the Proposed Development, studies for the River Dee have shown that extreme wind, wave, and tidal climates are not expected to change significantly from those that are currently exhibited. Additionally, long-term analyses have illustrated that although there was a slight increase in the severity of most extreme events, there was</li> </ul> </li> </ul> |

| Element Scoped Out | Justification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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|                    | <p>little change in the extreme wave and tidal climate predicted for the River Dee.</p> <ul style="list-style-type: none"> <li>○ When it reaches the end of its useful life the Proposed Development will be decommissioned safely, cleaned and flushed, filled with nitrogen, and left in situ.</li> <li>• <b>No likely significant effects arising from climate resilience have been identified during the design of the Proposed Development within the construction, operation and maintenance, and decommissioning phases. This topic has therefore been scoped out from further assessment of these phases.</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Cultural heritage  | <p><b>Construction phase</b></p> <ul style="list-style-type: none"> <li>• An assessment of construction effects of the Proposed Development on designated heritage assets that are either out of view or beyond the immediate vicinity (&lt;100 m) has been scoped out on the basis that there is unlikely to be a significant temporary effect from dust, noise and vibration and artificial lighting due to the distance between the works and these assets.</li> <li>• <b>No likely significant effects on above ground designated heritage assets have been identified during the design of the Proposed Development within the construction phase. This topic has therefore been scoped out from further assessment of this phase.</b></li> </ul> <p><b>Operation and maintenance phase</b></p> <ul style="list-style-type: none"> <li>• An assessment of operation effects on designated heritage assets has been scoped out on the basis that, the Proposed Development will be underground once it has been completed.</li> <li>• An assessment of operational effects on buried heritage assets have been scoped out on the basis that, once the Proposed Development has been completed, no further ground disturbance is expected as part of the Proposed Development. As such, effects on the buried archaeological resource are 'scoped out' of further consideration.</li> <li>• <b>No likely significant effects on designated and buried heritage assets have been identified during the design of the Proposed Development within the operation phase. This topic has therefore been scoped out from further assessment of this phase.</b></li> </ul> <p><b>Decommissioning phase</b></p> <ul style="list-style-type: none"> <li>• Decommissioning effects have been scoped out on the basis that there will be no further impact on buried archaeology from decommissioning activity if it takes place within land directly impacted by the Proposed Development. In addition, the</li> </ul> |

| Element Scoped Out      | Justification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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|                         | <p>decommissioning will broadly result in a return to current baseline conditions and therefore will result in no impact through changes in setting. Activities engaged in the removal of the above ground aspects of the Proposed Development will have a temporary impact on the setting of nearby built heritage assets; however, the mitigation will already be established and therefore will result in a negligible impact on the asset.</p> <ul style="list-style-type: none"> <li>• <b>No likely significant effects on designated and buried heritage assets have been identified during the design of the Proposed Development within the decommissioning phase. This topic has therefore been scoped out from further assessment of this phase.</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Biodiversity</b>     | <p><b>Operation and maintenance, and decommissioning phases.</b></p> <ul style="list-style-type: none"> <li>• An assessment of the operation, and decommissioning effects on biodiversity receptors has been scoped out on the basis that, once the buried pipeline has been installed, no further disturbance is expected. As such, effects on biodiversity receptors are scoped out from further consideration.</li> <li>• <b>No likely significant effects on biodiversity receptors have been identified during design development of the Proposed Development during operation and maintenance, and decommissioning. This topic has therefore been scoped out from further assessment of these phases.</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Greenhouse gases</b> | <p><b>Construction, operation and maintenance, and decommissioning phases.</b></p> <ul style="list-style-type: none"> <li>• Greenhouse gas (GHG) emissions from the operation of plant and equipment during the expected four week construction period are not considered to be likely or expected effects of the Proposed Development.</li> <li>• GHG emissions during construction are scoped out of the assessment as emissions associated with a short section of buried pipeline are deemed to be negligible.</li> <li>• There are no sources of GHG emissions during the operation of the Proposed Development. No receivers for pipeline inspection gauges (PIGs), or venting are planned for the Proposed Development project at this location. Therefore, consideration of the impact of this source of GHGs is not required.</li> <li>• When it reaches the end of its useful life the Proposed Development will be flushed and cleaned at locations remote from the river Dee. The Proposed Development will then be decommissioned safely, filled with nitrogen, and left in situ.</li> <li>• <b>No likely significant effects arising from climate resilience have been identified during the design of the Proposed Development within the construction, operation and</b></li> </ul> |

| Element Scoped Out                 | Justification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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|                                    | <p><b>maintenance, and decommissioning phases. This topic has therefore been scoped out from further assessment of these phases.</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <p><b>Land and soils</b></p>       | <p><b>Construction, operation and maintenance, and decommissioning phases.</b></p> <ul style="list-style-type: none"> <li>An assessment of the construction, operation, and decommissioning effects on land and soils receptors has been scoped out. The scoping out has been based on the following considerations: <ul style="list-style-type: none"> <li><b>Soils</b> – including peat, agricultural and sensitive and vulnerable soils will not be affected by the Proposed Development;</li> <li><b>Geology</b> – there are no designated areas of geological interest, and unstable natural ground that will be affected by the Proposed Development;</li> <li><b>Minerals</b> - mineral safeguarding areas, and mineral allocations and consents have not been identified within the Proposed Development; and</li> <li><b>Contaminated and hazardous land use</b> - the presence of known or suspected contaminated material associated with landfills and other potentially contaminative past activities has not been identified. There are no historic or currently active landfills recorded within the area. The area has a very low UXO hazard level with no significant sources of UXO hazard identified. There are no Top Tier COMAH (Control of Major Accidents Hazards) sites identified within the area of influence of the Proposed Development.</li> </ul> </li> <li><b>No likely significant effects on land and soils receptors have been identified during design development of the Proposed Development during construction, operation and maintenance, and decommissioning. This topic has therefore been scoped out from further assessment of these phases.</b></li> </ul> |
| <p><b>Landscape and visual</b></p> | <p><b>Construction, operation and maintenance, and decommissioning phases.</b></p> <ul style="list-style-type: none"> <li>An assessment of the construction, operation, and decommissioning effects on landscape and visual receptors has been scoped out. The scoping out has been based on the Proposed Development being entirely underground.</li> <li><b>No likely significant effects arising on Landscape and visual receptors have therefore been identified during the design of the Proposed Development within the construction, operation and maintenance, and</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Element Scoped Out                          | Justification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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|                                             | <p><b>decommissioning phases. This topic has therefore been scoped out from further assessment of these phases.</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <p><b>Major accidents and disasters</b></p> | <p><b>Construction, operation and maintenance, and decommissioning phases.</b></p> <ul style="list-style-type: none"> <li>An assessment of the construction, operation, and decommissioning effects arising from major accidents and disasters has been scoped out. The scoping out has been based on the consideration of the following construction, operation, and decommissioning risk event types: <ul style="list-style-type: none"> <li>MAH pipelines; The design, installation, commissioning, operation and maintenance of plant, drainage systems, equipment, and machinery, including associated systems, will consider Good Engineering Practice (<b>D-MD-002 of the REAC</b>).</li> <li>In accordance with good safety management principles, it has been assumed that all risks that have the potential to be major accidents and/or disasters, and could impact a local environmental receptor, will be managed using the ALARP principle.</li> <li>Prior to commissioning and the introduction of CO<sub>2</sub>, the existing pipeline will be verified and confirmed as fit for purpose and any necessary remedial works undertaken to ensure compliance with applicable regulatory regimes.</li> <li>At the operational stage, management systems will be in place for preventative maintenance including pipeline inspection and integrity checks and Emergency Plans that include emergency shutdown procedures.</li> <li>When it reaches the end of its useful life the Proposed Development will be flushed and cleaned at locations remote from the river Dee. The Proposed Development will then be decommissioned safely, filled with nitrogen, and left in situ.</li> </ul> </li> <li><b>No likely significant effects arising from major accidents and disasters have been identified during the design of the Proposed Development within the construction, operation and maintenance, and decommissioning phases. This topic has therefore been scoped out from further assessment of these phases.</b></li> </ul> |
| <p><b>Materials and waste</b></p>           | <p><b>Construction, operation and maintenance, and decommissioning phases.</b></p> <ul style="list-style-type: none"> <li>An assessment of the construction, operation, and decommissioning effects on materials and waste receptors has</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Element Scoped Out  | Justification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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|                     | <p>been scoped out. The scoping out has been based on the following considerations:</p> <ul style="list-style-type: none"> <li>○ <b>Material resource availability:</b> Key bulk construction materials required for the Proposed Development project in the North West of England and Wales doesn't represent any supply or stock issue. The anticipated diversion of waste from landfill through stockpiling and storage of earthwork arisings to maximise onsite reuse and are unlikely to have any effects on remaining landfill capacity. Therefore, no material resource issue is anticipated for the Proposed Development.</li> <li>○ <b>Mineral safeguarding areas:</b> Mineral Safeguarding Areas (MSAs) are represented on the Cheshire West and Chester Local Plan Interactive Policies Map and the Flintshire LDP 2019 (Interactive Map). However, the Proposed Development is not within, and nor is it close to sand and gravel reserves.</li> <li>○ <b>Site arisings currently generated:</b> The current land use within the Proposed Development is expected to generate minimal volumes of site arisings. The volumes of site arisings generated by the installation of the bored tunnel, are likely to be re-used on site for backfill of excavations.</li> <li>○ <b>Existing Waste Transfer, Recovery and Recycling Management Facilities:</b> The availability of materials recovery infrastructure regionally and across North West England, and Wales, suggests that there is strong potential to divert site arisings from landfill.</li> <li>• <b>No likely significant effects arising from major accidents and disasters have been identified during the design of the Proposed Development within the construction, operation and maintenance, and decommissioning phases. This topic has therefore been scoped out from further assessment of these phases.</b></li> </ul> |
| Noise and vibration | <p><b>Construction phase</b></p> <ul style="list-style-type: none"> <li>• The assessment of construction impacts typically addresses the potential for impacts from noise on nearby sensitive receptors. As the Proposed Development relates to the construction of a trenchless crossing tunnel bore, there is no potential for noise impacts from the marine licensable activities, as they will be below ground.</li> <li>• Alongside generic mitigation proposed in the <b>REAC</b>, and <b>OCEMP</b>, the Proposed Development trenchless crossing depth below riverbed would be a minimum of 8m for micro-tunnelling, and a minimum of 15m for HDD. The increased depth of the Proposed Development will also reduce the impact of vibration</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Element Scoped Out | Justification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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|                    | <p>and surface noise on fish, as excavation pits will need to be located at least 16m from the watercourse compared to usual operative depths. Where practicable, timings of works will be scheduled so not to conflict with the seasonal constraints associated with estuarine environments.</p> <ul style="list-style-type: none"> <li>• The main sources of noise will be from the operation of the drilling rig, and pipe sites required for the trenchless installation of the Proposed Development tunnel bore (see <b>Figure 2--1</b>, <b>Figure 2--2</b>, and <b>Figure 2-4</b>).</li> <li>• The entrance/exit pits will be situated at least 16m from the riverbank. However, noise generated by construction activities associated with the river Dee crossing may result in adverse impacts to qualifying bird species of the SPA, notably redshank. As the noise effects during construction of the Proposed Development relate solely to biodiversity receptors, the assessment of these effects has been scoped into the biodiversity assessment and is therefore reported in <b>Section 5: Biodiversity</b>.</li> <li>• <b>Except for potential impacts on qualifying bird species of the SPA, no likely significant effects on noise sensitive receptors have been identified during the design of the Proposed Development within the construction phase. This topic has therefore been scoped out from further assessment of this phase.</b></li> </ul> <p><b>Operation and maintenance, and decommissioning phases</b></p> <ul style="list-style-type: none"> <li>• An assessment of the operation, and decommissioning effects on noise and vibration sensitive receptors has been scoped out. The scoping out has been based on the following considerations: <ul style="list-style-type: none"> <li>○ The buried pipeline will have no operational plant and equipment that would generate noise and vibration.</li> <li>○ When it reaches the end of its useful life the Proposed Development will be flushed and cleaned at locations remote from the river Dee. The Proposed Development will then be decommissioned safely, filled with nitrogen, and left in situ. There would be no decommissioning activities associated with the Proposed Development that would generate noise and vibration.</li> </ul> </li> <li>• <b>No likely significant effects arising from noise and vibration have been identified during the design of the Proposed Development within the operation and maintenance, and decommissioning phases. This topic has therefore been scoped out from further assessment of these phases.</b></li> </ul> |

| Element Scoped Out                        | Justification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| <p><b>Population and human health</b></p> | <p><b>Construction, operation and maintenance, and decommissioning phases.</b></p> <ul style="list-style-type: none"> <li>Given the pre-existing nature of the development area, it is unlikely that there will be any potential effects and/or impacts resulting from the construction, operation and maintenance, and decommissioning of the development area as compared to those previously exhibited on socio-economics in the area.</li> <li>Specifically, the Proposed Development will not alter any current socio-economic opportunities within the vicinity of the Proposed Development. This is because the bored tunnel under the river Dee will have no operational plant and equipment that would create employment opportunities.</li> <li>Additionally, the buried nature of the Proposed Development means there will be no routine maintenance events, and operations will be run through the existing onshore control room and terminal located at Point of Ayr in Flintshire.</li> <li><b>No likely significant effects arising from traffic and transport have been identified during the design of the Proposed Development within the construction, operation and maintenance, and decommissioning phases. This topic has therefore been scoped out from further assessment of these phases.</b></li> </ul> |
| <p><b>Traffic and transport</b></p>       | <p><b>Construction, operation and maintenance, and decommissioning phases.</b></p> <ul style="list-style-type: none"> <li>An assessment of the construction, operation, and decommissioning effects on traffic and transport receptors has been scoped out. The scoping out has been based on the following considerations: <ul style="list-style-type: none"> <li>Construction traffic associated with the Proposed Development is too low to trigger the need for a quantitative assessment as per IAQM Guidance.</li> <li>The operation of the Proposed Development does not include any above ground infrastructure, which would result in any increases in traffic flow or changes to traffic composition. Consequently, there will be no effect on the local road network.</li> <li>When it reaches the end of its useful life the Proposed Development will be flushed and cleaned at locations remote from the river Dee. The Proposed Development will then be decommissioned safely, filled with nitrogen, and left in situ. Consequently, there will be no activities, related</li> </ul> </li> </ul>                                                                                                                                                                                                                   |

| Element Scoped Out                             | Justification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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|                                                | <p>to the marine licensable activities, that would result in traffic increases on the local road network.</p> <ul style="list-style-type: none"> <li>• <b>No likely significant effects arising from traffic and transport have been identified during the design of the Proposed Development within the construction, operation and maintenance, and decommissioning phases. This topic has therefore been scoped out from further assessment of these phases.</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p><b>Water environment and flood risk</b></p> | <p><b>Construction, operation and maintenance, and decommissioning phases</b></p> <ul style="list-style-type: none"> <li>• The potential for accidental pollution to be released during the construction phase of the Proposed Development is present. This pollution could potentially result from sources such as equipment, plant, and machinery. However, the risk of these events is very low, as very few items of plant and equipment are required for the construction of the Proposed Development, and all activities will be carried out at least 16m away from the river.</li> <li>• Furthermore, these risks will be managed through the <b>REAC</b> commitments, <b>CEMP</b>, Pollution Prevention Guidelines (PPGs), and Pollution Contingency Plans. As reported in the <b>WFDa</b>, following the implementation of the measures identified in the <b>REAC</b>, and <b>OCEMP</b> there would be no adverse effects on the water environment and flood risk.</li> <li>• Most of the potential impacts arising from the Proposed Development on the River Dee watercourse would be during the Construction Stage. Consequently, those impacts would primarily be temporary and with only localised impacts and following the implementation of the measures detailed within the <b>OCEMP</b> and <b>REAC</b>, the Proposed Development would not adversely affect the water environment.</li> <li>• An assessment of the construction, operation and maintenance, and decommissioning effects on the water environment and has been scoped out. The scoping out has been based on the following considerations: <ul style="list-style-type: none"> <li>○ <b>Surface water, and groundwater quality:</b> Alongside generic mitigation, the Proposed Development trenchless crossing depth below riverbed would be a minimum of 8m for micro-tunnelling, and a minimum of 15m for HDD. This reduces the likelihood of chemical pollution entering the watercourse as a result of blowouts. Additionally, due to the tidal characteristics present at the proposed crossing point, and increased buffering capacity of the downstream estuary, the impact of any pollution is likely to be minimal.</li> <li>○ <b>Groundwater levels and flows:</b> Due to the temporary nature of trenchless crossing works, no change to overall groundwater balance is anticipated. The <b>WFDa</b> concluded</li> </ul> </li> </ul> |

| Element Scoped Out | Justification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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|                    | <p>that Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourse. Therefore, besides the localised nature of this activity and the much larger area of the water body, the impact of dewatering is expected to be negligible at the WFD water body scale.</p> <ul style="list-style-type: none"> <li>○ <b>Groundwater abstractions:</b> No Source Protection Zone designations related to abstractions that are within 1 km of the Proposed Development, and abstractions and discharges beyond 1 km of the Proposed Development were scoped out as it was determined by professional judgement that the Proposed Development will have a negligible effect on resources beyond this distance. Also, due to the temporary nature of trenchless crossing works, no change to overall groundwater balance is anticipated.</li> <li>○ <b>Groundwater Dependent Terrestrial Ecosystems:</b> A review of the Environment Agency's data on GWDTEs has identified that within the Proposed Development Boundary only the River Dee Estuary has been classified as a potential GWDTE, as part of the Dee Estuary / Aber Afon Dyfrdwy SSSI. Due to temporary nature of trenchless crossing works, there will be no sustained change of water supply to GWDTE. The identified GWDTE also has a low groundwater dependency. No change to GWDTEs is anticipated.</li> <li>○ <b>Flood risk – Fluvial, tidal, groundwater:</b> In Wales, based on the Flood Map for Planning (Ref. Natural Resource Wales. (2021). Flood Map for Planning. Retrieved from: <a href="https://flood-map-for-planning.naturalresources.wales">https://flood-map-for-planning.naturalresources.wales</a>), the Proposed Development Boundary crosses the defended tidal Flood Zone C1 at the Dee Estuary. This area is extensive and will have a probability of tidal flooding in excess of 0.5% every year in the absence of flood defences, however it is protected by tidal flood defences. These defences run along the edge of the River Dee. No change to overall flood risk from all sources is anticipated.</li> <li>• <b>No likely significant effects arising on the water environment and flood risk have been identified during the design of the Proposed Development within the construction, operation and maintenance, and decommissioning phases. This topic has therefore been scoped out from further assessment of these phases.</b></li> </ul> |

### 3.3.

## ELEMENTS SCOPED INTO THE ASSESSMENT

#### 3.3.1.

The elements shown in **Table 3.2** are considered to have the potential to give rise to likely significant effects as a result of the Proposed Development. The justification for scoping these elements into the assessment is presented in **Table 3.2**.

**Table 3.2 – Elements Scoped In for Assessment**

| Element Scoped In        | Justification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Cultural heritage</b> | <b>Construction phase</b> <ul style="list-style-type: none"><li>An assessment of construction effects of the Proposed Development on geoarchaeological and palaeoenvironmental potential assets has been scoped into the assessment. This is because preliminary assessment has identified the presence of tidal creek systems and palaeochannels across the floodplain of the River Dee. The pipeline crossing of the River Dee will be carried out using a trenchless crossing technique, either micro-tunnelling or HDD, which could potentially impact on previously unrecorded palaeoenvironmental remains.</li><li><b>This topic has therefore been scoped in for further assessment from the construction phase.</b></li></ul>                                                                                                                                                                                                                                                                                                               |
| <b>Biodiversity</b>      | <b>Construction phase.</b> <ul style="list-style-type: none"><li>The pipeline crossing of the River Dee will be carried out using a trenchless crossing technique, either micro-tunnelling or HDD, which could create vibration that impacts fish populations, and potential chemical, and artificial light pollution that could impact the biological quality of the River Dee.</li><li>There is potential disturbance as a result of construction activities / movements and noise to breeding and wintering birds / waterfowl which are qualifying features of the Mersey Estuary SPA &amp; Ramsar &amp; SSSI Dee Estuary SPA &amp; Ramsar &amp; SSSI.</li><li>During construction there is the potential for dust emissions, noise and vibration disturbance, and artificial illumination of habitats from lighting due to the proximity of trenchless crossing construction activities to the River Dee.</li><li><b>These biodiversity aspects have therefore been scoped in for further assessment from the construction phase.</b></li></ul> |

#### 3.3.2.

The cultural heritage, and biodiversity elements identified in **Table 3.2** have therefore been ‘scoped in’ to this assessment and are discussed and assessed in the following sections of this **Environment Report**.

## **4. CULTURAL HERITAGE**

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### **4.1. APPROACH TO ASSESSMENT**

- 4.1.1. The cultural heritage assessment considers potential impacts on heritage assets in the form of buried archaeological remains. The assessment considers the potential for impacts to occur during construction, as the Proposed Development will have no continued impacts once construction is complete. Assessment of the end-of-life decommissioning stage is scoped out of the assessment as any buried archaeology will already have been impacted at the construction stage.

### **4.2. BASELINE CONDITIONS**

#### **DATA COLLECTION**

- 4.2.1. Information on baseline conditions was collected through desk study, walkover survey and consultation. A geophysical survey, which involves using specialist radar equipment to collect data on below-ground conditions, was undertaken to better understand the below-ground assets in the area.

#### **TOPOGRAPHY AND GEOLOGY**

- 4.2.2. Within Cheshire, the landscape is characterised by rolling hills which are intercut by successive river valleys and streams, along with extensive low-lying areas of former marshland. Notably, these include the River Dee. The natural topography is lower across the Ince Marshes (where alluvium is present) and rises gradually from here towards the River Dee Valley. The ground level rises gradually from the River Dee valley in Mancot and Sandycroft flattening out towards Ewloe.
- 4.2.3. Within the River Dee valley the topography becomes relatively flat, which forms an extensive floodplain containing superficial deposits of alluvium and in parts Glaciofluvial deposits.

#### **ARCHAEOLOGICAL AND HISTORICAL BACKGROUND**

- 4.2.4. The evidence for Roman activity (period AD43—410), is limited to the lines of suspected Roman roads. The closest evidence of Roman settlement and extensive activity is found in and around the Pentre Bridge Roman Scheduled Monument (FL131) located on the southern bank of the River Dee.
- 4.2.5. The post medieval period (AD 1540—1901) shows settlement patterns during the early 16th century and consisting of islands of settled and agriculturally developed land. These are set in areas of open unmodified or unused land, and the wetlands of the region located around the River Dee floodplains that continued to be marshy and largely uninhabited.

## GEOARCHAEOLOGICAL DEPOSIT MODEL REPORT

- 4.2.6. Oxford Archaeology undertook a geoarchaeological deposit model where the route traverses large tracts of tidal flat and peat deposits associated with the low-lying floodplains and marsh of the River Dee. The main aim of the work was to provide preliminary baseline data on the nature and depth of the sediment sequences and their geoarchaeological and palaeoenvironmental potential to inform the design of future evaluation and mitigation strategies.
- 4.2.7. The results of recent geotechnical ground investigation and historical boreholes sourced from the British Geological Survey (BGS) were used to prepare a geoarchaeological model. The result of the modelling is broadly consistent with the BGS mapping of the area of the River Dee, with superficial sedimentary sequences dominated by minerogenic sands, clays, and silts, likely laid down in intertidal/alluvial environments. The thickness of Holocene deposits overlying Pleistocene glacial deposits was recorded to a maximum depth of c. 18.5m on the Dee.
- 4.2.8. Thin peats are recorded from parts of the River Dee floodplain, although the distribution here was found to be somewhat poor, with much of the data deriving from shallow test-pit interventions.
- 4.2.9. Analysis of LiDAR Digital Terrain Model (DTM) data has clearly identified the presence of tidal creek systems and palaeochannels, particularly across the floodplain of the River Dee.

## 4.3. IMPACT ASSESSMENT

### CONSTRUCTION

- 4.3.1. There is potential for direct impacts leading to significant effects on previously unrecorded buried heritage assets (archaeology) from the Proposed Development during the Construction Stage. The majority of the features identified from the aerial photograph and LiDAR report and from the geophysical survey are unlikely to be of more than **low value**, forming the remains of previous agricultural activity, former field boundaries and late post-medieval industrial activity. Survival potential for previously unrecorded buried heritage assets is also likely to be variable around the River Dee floodplain
- 4.3.2. Any ground disturbance associated with the Proposed Development will likely result in a *major magnitude* of impact on the asset, resulting in a *slight adverse (not significant)* effect.
- 4.3.3. Based on the results of the geoarchaeological deposit model around the River Dee crossing, there is potential for effects by the Proposed Development upon subsurface deposits such as peat, which may be close to the surface. The results of the geoarchaeological deposit model indicate that the subsurface deposits are of *low* or *medium* value and are of archaeological interest for the information they contain about past environments and past landforms. While the

magnitude of impact on any subsurface deposits would vary locally, it is unlikely to be more than *minor*, as the Proposed Development will not remove the deposits in their entirety, and they extend outside of the impacted area. Taking a worst-case scenario where deposits are of *medium* value, this will result in a *slight adverse (not significant)* effect.

## OPERATION AND MAINTENANCE

- 4.3.4. The operation stage has been scoped out on the basis that following construction there will be no further impact on buried archaeology (See **Table 3.1**).

## DECOMMISSIONING

- 4.3.5. The decommissioning stage has been scoped out on the basis that following construction there will be no further impact on buried archaeology (See **Table 3.1**).

## 4.4. MITIGATION AND ENHANCEMENT MEASURES

- 4.4.1. This section sets out the preliminary avoidance, mitigation and compensation measures required to address the significant effects as assessed in **Section 4.3**.
- 4.4.2. It is considered that effects from direct physical impacts on sub-surface heritage assets during the Construction Stage are anticipated in areas of interest identified during the assessment of the LiDAR and aerial photography, and on the features identified during the geophysical survey. Where appropriate the proposed work will comprise the following targeted activities:
- Geoarchaeological mitigation, comprising Further boreholes and/or test pitting within the River Dee floodplain to retrieve sediments for geoarchaeological and palaeoenvironmental purposes and to investigate peat deposits;
  - Preservation in situ;
  - Archaeological excavation;
  - Archaeological strip, map, and sample; and
  - Proportionate and appropriate post-excavation analysis and reporting.
- 4.4.3. The **Register of Environmental Actions and Commitments (REAC)** provides the general mitigation commitments, which are detailed in an **Outline Archaeological WSI (OAWSI)**. The **OAWSI** has been submitted alongside the HyNet Carbon Dioxide Pipeline DCO Application (which includes the trenchless crossing of the River Dee) to detail the methodologies for any further investigation and mitigation required following the granting of the DCO. This includes areas where preservation *in situ* may be required, and further investigation of geoarchaeological deposits.

- 4.4.4. Any archaeological investigations required will be designed and undertaken in consultation with the relevant Archaeological Advisor (the LPA) and in accordance with an approved archaeological WSI (**REAC** entry **D-CH-001**).
- 4.4.5. Good construction practices outlined in the **OCEMP** and the **REAC** will reduce any temporary impacts that will occur in the Construction Stage.

#### **4.5. RESIDUAL EFFECTS**

- 4.5.1. There are no anticipated residual effects from the Proposed Development as should archaeology be present it will have been excavated and preserved by record.

## 5. BIODIVERSITY

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### 5.1. APPROACH TO ASSESSMENT

- 5.1.1. The assessment considers the potential impacts upon protected species and protected or valuable habitats, including nationally and internationally designated sites associated with the Proposed Development.
- 5.1.2. The assessment considers the potential for impacts during the construction stage (see **Table 3.2**), on the following aspects:
- Temporary land take will be required to facilitate trenchless installation techniques at the River Dee SAC and SSSI. However, at trenchless crossing locations, any temporary land take will be located on land outside the boundary of the designated sites.
  - Indirect impacts to water quality, hydrological and hydromorphological processes due to changes in groundwater links to the River Dee SAC during construction.
  - Potential vibration caused by trenchless installation activities impacting on migratory fish / fish passage and other protected species that are features of the River Dee SAC.
  - Potential disturbance as a result of construction activities / movements and noise to breeding and wintering birds / waterfowl which are qualifying features of the Mersey Estuary SPA & Ramsar & SSSI Dee Estuary SPA & Ramsar & SSSI.
  - Potential for dust emissions, noise and vibration disturbance and artificial illumination of habitats from lighting due to the proximity of construction activities to the River Dee SAC and SSSI.

### 5.2. BASELINE CONDITIONS

#### DATA COLLECTION

- 5.2.1. Information on the baseline conditions was collected through desk study, consultation and an extensive programme of surveys of various species and animal groups (including Great Crested Newt, bats, badger, otter, water vole, barn owl, breeding birds, wintering birds and fish), as well as habitat surveys. Further details can be found in the **HRA**, and **WFDa** that accompany the Marine Licence application.

#### EXISTING BASELINE

##### Internationally Designated Sites- Statutory and Non-Statutory Designated Sites

- 5.2.2. **River Dee and Bala Lake SAC- Approximate size 1,309 ha:** The SAC is designated for its presence of sea lamprey *Petromyzon marinus*, brook lamprey

Lampetra planeri, Atlantic salmon *Salmo salar* and plant species such as floating water-plantain *Luronium natans*

5.2.3. **Dee Estuary / Aber Dyfrdwy SAC- Approximate size 15,806 ha:** This large site comprises an estuary, saltmarshes, mudflats and sandflats. The SAC is designated for its presence of mudflats and sandflats which during low tide are not covered by seawater. The SAC also mentions the importance of annuals, including *Salicornia* sp., which colonize the mud and sands within the site area. Atlantic salt meadows *Glauco-Puccinellietalia maritimae* form the most extensive type of saltmarsh in the Dee, helping displace vast amounts of *Spartina anglica*, a non-native common cordgrass.

5.2.4. **The Dee Estuary SPA & Ramsar- Approximate size 14,292ha:** The Dee Estuary is a large, sheltered estuary which is internationally important due to the number of waterfowl and waders it supports. Qualifying interests include a breeding colony of natterjack toad *Bufo calamita* and over 20,000 individual waterbirds each year such as redshank *Tringa totanus* and black-tailed godwit *Limosa limosa*.

#### **Nationally Designated Sites- Statutory and Non-Statutory Designated Sites**

5.2.5. **Afon Dyfrdwy (Wales) / River Dee (England) SSSI- approximate size 1,490 ha:** Afon Dyfrdwy (River Dee) is of special interest for its fluvial geomorphology and range of river habitat types, as well as saltmarsh transition habitats. It is also of special interest for populations of floating water plantain *Luronium natans*, slender hare's-ear *Bupleurum tenuissimum*, sea barley *Hordeum marinum*, hard-grass *Parapholis strigosa*, otter, salmon, European bullhead, brook lamprey, river lamprey *Lampetra fluviatilis*, sea lamprey, club-tailed dragonfly *Gomphus vulgatissimus* and other aquatic invertebrates. The River Dee is of special interest for Atlantic salmon for which it is one of the Environment Agency's index rivers. The Mynach, Meloch and Ceiriog tributaries are the most important salmon spawning tributaries in the Dee catchment and are included within the Afon Dyfrdwy SSSI. The lower reaches of the River Dee support Britain's only known population of the stonefly *Isogenus nubecula*, which is classified as vulnerable in the Red Data Book. Furthermore, the nationally scarce weevil *Baris lepidii* has been recorded along the lower Dee and has not been recorded on any other Welsh river.

#### **Wintering birds**

5.2.6. River Dee is considered to have a UK or National level of conservation importance as species of conservation concern.

5.2.7. Desk Study and a field survey completed during winters 2020/2021 and 2021/2022 identified a variety of bird species listed as LBAP (**Ref.** Cheshire West and Chester Council, (2015). Cheshire West and Chester Local Plan 2015 – 2030. Available at: <http://consult.cheshirewestandchester.gov.uk/file/4844198>) and/or Schedule 1 WCA (**Ref.** HMSO (1981). Wildlife and Countryside Act (as

amended by the Countryside and Rights of Way Act 2000). HMSO, London) were recorded during surveys. Species listed within citations of the Mersey Estuary SPA were recorded along the River Dee in small numbers. Redshank were recorded using the mudflats exposed by low tide along the River Dee in numbers greater than the 1% of citation population for the SPA, only during the winter months and were not recorded regularly on any other survey transect throughout the year. The abundance of similar habitats with suitability to support wintering bird species, including redshank, beyond the Newbuild Infrastructure Boundary, has been considered when determining an importance value.

### **Aquatic Habitats**

- 5.2.8. River Dee habitat surveys showed that the number of habitats present both inter-tidally and sub-tidally was extremely limited with the area being characterised by a thin strip of truncated and eroding saltmarsh, which gave way to predominantly sandy inter-tidal sediments classified as oligochaetes in variable salinity littoral mobile sand (LS.LSa.MoSa.OIVS), a species-poor habitat type. Some rocks were within this habitat type, but these were bare. The inter-tidal sediments had a very low diversity and a low density of individuals and as such probably do not provide very good habitat for wading birds. Only one habitat type (infralittoral mobile sand in variable salinity) was observed in sub-tidal areas. As expected, this also had a very low diversity and low macrofaunal abundances which reflects both the low mean salinity experienced by the benthic macrofauna and the speed of the current. A very narrow band of saltmarsh occurred at the top of the river banks over the majority of the survey area. Since it was constrained by steep banks and sometimes rip rap, the saltmarsh didn't show typical zonation and transitioned into terrestrial habitat very quickly. All the marsh was classified as SM28 (*Elymus repens* saltmarsh community)

### **Fish**

- 5.2.9. Desk study revealed fish species of conservation interest in the River Dee, and a field survey using seine netting was carried out on the River Dee, resulting in the recording of two species of conservation concern: sea trout in March 2022 and smelt in May 2022.

### **Aquatic macroinvertebrates**

- 5.2.10. Field survey on aquatic macroinvertebrates and a benthic macroinvertebrate grab sampling was additionally conducted on the River Dee and no aquatic macroinvertebrate species of conservation importance were recorded.

### **Invasive Non-Native species**

- 5.2.11. During the desk study and consultation with NRW, it was identified the presence of giant hogweed, Himalayan balsam and Chinese mitten crab *Eriocheir sinensis* on the River Dee.

## **FUTURE BASELINE**

- 5.2.12. Although species abundance and distribution within the Proposed Development may naturally fluctuate, it is considered likely that habitats within the Proposed Development would remain similar to those of the current baseline in the future.

## **5.3. IMPACT ASSESSMENT**

### **OVERVIEW**

- 5.3.1. A detailed assessment of the potential effects of the Proposed Development on biodiversity receptors is presented in the **HRA**, which accompanies the Marine Licence application.
- 5.3.2. The **HRA** provides a description of the identified European Sites. It also presents consideration of potential effects of the Proposed Development upon the European Sites (including in-combination effects), and whether these are likely to be significant. Where Likely Significant Effects (LSE) are identified, these are addressed under a section covering Appropriate Assessment.
- 5.3.3. This section of the **Environment Report** provides a summary of the main effects identified within the **HRA**.

### **CONSTRUCTION**

#### **Temporary land take effects**

- 5.3.4. The crossing under the River Dee will be carried out using specialist trenchless crossing methods (HDD or Micro-Tunnelling method) at the minimum trenchless crossing depths detailed in **paragraph 6.2.20**. In addition, the entrance/exit pits will be situated at least 16m from the riverbanks, therefore located outside the boundaries of the SAC. Habitat loss as a result of bentonite frac-out is assessed separately as part of hydrological effects (see (g) below). There is no functionally linked habitat associated with the qualifying habitats or fish species of the SAC present that would be impacted by the Proposed Development. As such, the Proposed Development will not result in direct or indirect impacts as a result of habitat loss or mortality to these qualifying features.
- 5.3.5. The crossing would avoid works within the River Dee and would be undertaken at the minimum trenchless crossing depths detailed in **paragraph 2.1.2** and the entrance/exit pits will be situated at least 16m from the riverbanks. As such, there would be no severance of habitat for qualifying species of the SAC.

#### **Water quality, hydrological and hydromorphological effects**

- 5.3.6. Further to the information presented in **paragraphs 2.12 to 2.2.22**, given the geotechnical information and the minimum trenchless crossing depths for the River Dee, a frac-out event of bentonite is not considered likely. As such, no significant effects have been identified because of hydrological impacts through use of bentonite from trenchless crossings.

### **Effects on fish and protected species**

- 5.3.7. The specialist trenching crossing would avoid works within the River Dee watercourse and would be undertaken at the minimum trenchless crossing depths detailed in **paragraph 2.1.2**. Geotechnical investigations either side of the River Dee identified the presence of tidal flat deposits consisting of sand and clay between 0 and 18 metres below ground level (mbgl). These deposits were underlain by glacial till deposits consisting of stiff clay to at least a depth of 30 mbgl. With the minimum trenchless crossing depths, the intensity of vibration at the riverbed would be negligible and therefore not incur disturbance to fish. As such, no likely significant effects are predicted in relation to vibration disturbance impacts to fish species.
- 5.3.8. As detailed in **paragraph 2.2.13**, the crossing of the River Dee may require 24-hour working and may therefore require lighting at the location of the entrance/exit pits. The trenchless methods would include entrance/exit pits that will be a minimum of 16m from the riverbanks. Light spill onto the River Dee has the potential to adversely impact the qualifying fish species and may prevent movement upstream or within the watercourse (a fragmentation effect), of particular importance for migratory species such as salmon and lamprey. It is therefore considered that in the absence of mitigation in relation to disturbance from lighting, there is potential for significant effects to occur.

### **Effects on birds**

- 5.3.9. The Proposed Development is approximately 3.9 km from the Ramsar at its closest point and therefore disturbance of qualifying species within the Ramsar would not occur. Pintail, grey plover, knot, dunlin, black-tailed godwit, and bar-tailed godwit were not recorded during the baseline bird surveys and are therefore not considered further in relation to disturbance.
- 5.3.10. The River Dee and its associated habitats (mudflats) are the primary location of interest for qualifying species of the Ramsar within the marine licensable area. Numbers of qualifying bird species recorded elsewhere were low and did not exceed the numbers recorded along the River Dee. Shelduck, teal, oystercatcher and curlew were recorded in low numbers along the River Dee in comparison to the Ramsar population (less than 1% of the Ramsar population for the peak count and less than 0.1% for mean monthly counts). As such, disturbance of these species would not result in a potentially significant effect.
- 5.3.11. Redshank on passage were recorded in numbers greater than 1% (peak count and mean monthly count), although only the peak count was greater than 1% for over wintering redshank. Redshank also forms part of the bird assemblage qualification for the Ramsar. The Proposed Development crosses the River Dee using specialist trenchless crossing methods, with the exit and entry pits located at least 16m from the riverbanks. The natural topography at the River Dee means the river and mudflat habitat are set below the ground level at the top of the banks (a difference in elevation of approximately 2m). As such, human presence at the exit/entrance pits near the River Dee is not anticipated to be in

a line of sight of Ramsar qualifying birds using the mudflat habitat along the same side of the river and would therefore naturally reduce disturbance resulting from human presence. Impacts as a result of human presence are not considered to give rise to a potentially significant effect.

- 5.3.12. Predicted noise levels at 10m from the trenchless installation techniques are predicted to be 82dB. The exit and entry pits would be located at least 16m from the riverbanks and the resultant noise levels at 16m from the trenchless installation techniques are predicted to be approximately 78dB. As such, the noise levels are predicted to exceed thresholds that may elicit a response and cause disturbance to redshank that may use the mudflat habitats of the River Dee.
- 5.3.13. The elevation difference between the mudflat habitat and exit/entrance pits is estimated to be at approximately 2m, potentially resulting in a small degree of attenuation. The crossing of the River Dee is expected to take up to four weeks (**paragraph 2.1.2**) and would therefore be relatively short in duration. However, it is considered that this could give rise to a potentially significant effect from noise disturbance in the absence of mitigation.
- 5.3.14. As detailed in **paragraph 2.2.13**, 24-hour working is anticipated for up to a four-week period to construct the River Dee crossing. The trenchless methods would include entrance/exit pits that will be a minimum of 16m from the riverbanks. Artificial lighting would be required during night working and light spill onto the mudflats may result in the disturbance of redshank, which may roost on the mudflat habitat along the river. Whilst there is availability of sufficient alternative habitat resource in the surrounding area, for the purpose of this assessment, it is considered that this could give rise to a potentially significant effect from lighting disturbance in the absence of mitigation.

#### **Effects on habitats**

- 5.3.15. The crossing of the River Dee will be carried out using specialist trenchless crossing methods with the entrance/exit pits situated at least 16m from the riverbanks. However, trenching on the approach to the entrance/exit pits would be achieved through open-cut techniques. Impacts from dust deposition are generally realised within approximately 50m of the source. As such, dust generated from construction activities within 50m of the River Dee could give rise to adverse effects from either the smothering of vegetation/habitats or a deterioration in water quality within the river.

#### **OPERATION AND MAINTENANCE**

- 5.3.16. The operation stage has been scoped out on the basis that following construction there will be no further impact on biodiversity (See **Table 3.1**).

#### **DECOMMISSIONING**

- 5.3.17. The decommissioning stage has been scoped out on the basis that following construction there will be no further impact on biodiversity (See **Table 3.1**).

## 5.4. MITIGATION AND ENHANCEMENT MEASURES

### GENERAL PRINCIPLES

- 5.4.1. A CEMP will be produced and implemented throughout the Proposed Development and during all construction activities. The CEMP will be produced by the Construction Contractor prior to the commencement of construction and will specify measures to avoid/control impacts on the natural environment. The CEMP will be informed by the measures detailed within the **OCEMP** and a **REAC** that accompany the Marine Licence application.
- 5.4.2. The CEMP will include the following avoidance and mitigation measures designed to reduce harm to biodiversity receptors:
- Best practice measures to be followed during construction in relation to dust deposition;
  - Pre-commencement surveys to update baseline information relating to otter, the implementation of avoidance and mitigation measures if holts or resting places are identified or, if impacts are unavoidable, the implementation of an EPS licence obtained from the relevant statutory body;
  - Measures to avoid entrapment of otters in voids, trenches or pipes;
  - Appropriate lighting design to avoid of reduce impacts of light spill around the River Dee on birds and fish;
  - Noise screening methods for works around the River Dee, if required, to reduce noise disturbance to qualifying bird species (namely redshank); and
  - Best practice measures to be followed during construction in relation to pollution prevention.
- 5.4.3. The above mitigation measures are captured within the REAC and would be secured and implemented within the CEMP (OCEMP).
- 5.4.4. Following the implementation of the above mitigation measures, it is concluded that the Proposed Development would not adversely affect the integrity of the European Sites either alone or in-combination.
- 5.4.5.

### FISH AND PROTECTED SPECIES

#### Fish

- 5.4.6. Where lighting is required during construction, a suitable lighting design will be developed and implemented (measure D-BD-015 of the REAC). This will include:
- Avoidance of artificial lighting of the River Dee, particularly during the hours of darkness, to prevent impacts to fish behaviour or passage;
  - Avoidance of light spill through use of directional and/or baffled lighting;

- Positioning of lighting columns away from the River Dee and also facing away from the River Dee; and
- Reducing the height of lighting columns to reduce light spill onto adjacent habitats.

5.4.7. Where practical and reasonable, timings of works scheduled to avoid sensitive lifecycle stages (migration and spawning) (**D-BD-058** of the **REAC**) and measures will include where possible, seasonal timings of works that will aim to avoid risk of impacts to fish populations to account for sensitive life cycle stages (migration and spawning). Where this is not possible, applications for exemptions will be sought from NRW on a case-by-case basis. Seasonal restrictions for consideration are:

- 1 October to 31 April - European eel, lamprey and salmonids.
- 15 March to 15 June - Coarse fish.
- Only upon receipt of granted exemptions and implementation of any necessary required mitigation can works commence.

5.4.8. The implementation of a Noise and Vibration Management Plan (NVMP), to be prepared at the Detailed Design stage, will include, where practicable:

5.4.9. a) Utilisation of press or vibratory pile driving methods,

5.4.10. b) Soft-starts to pile driving to allow for fish dispersal, and

5.4.11. c) Phased or intermittent works schedule (break periods) to allow for windows of fish recovery and movement through the works area (**D-BD-057** of the **REAC**) of those fish species present, that will be considered to ensure that appropriate construction methods can be implemented to minimise and avoid disturbance or avoidance behaviour.

5.4.12. Therefore, given the localised nature of this activity and implementation of mitigation measures, the impact of the trenchless crossing is not expected to cause significant alteration to fish at the WFD water body scale (see **WFDa** for further details).

5.4.13. Following the implementation of the above mitigation, no significant adverse effects on fish from disturbance and fragmentation are likely to occur.

### **Otter**

5.4.14. To mitigate impacts to otter holts/resting sites, updated pre-commencement surveys will be undertaken to verify that the baseline data remains accurate and to identify any changes, such as a change in location or new location(s) of otter resting sites (measure **B-DB-035** of the **REAC**). If otter resting sites are recorded but an offence can be avoided through mitigation, the Ecological Clerk of Works (ECoW) will develop an appropriate plan and work with the Construction Contractor to implement this (measure **B-DB-035** of the **REAC**). Where suitable mitigation cannot be implemented to avoid an offence, an EPS licence will be sought from the relevant statutory body. The EPS licence would

be supported by appropriate mitigation, such as timing of the works and ecological supervision, to further reduce the impacts of the Proposed Development. The EPS licence would also identify any necessary compensation, as agreed with the relevant statutory body. As such, no adverse impact on the integrity of the SAC is concluded with regard to loss of otter habitat (holts or resting places).

- 5.4.15. To prevent entrapment of otter and other wildlife, trenches or voids created will be excavated and infilled within the same working day. If this is not practicable, suitable means of escape will be provided (such as a ramp at no greater than a 45° angle) at regular intervals along the excavated trench excavations. Any void will then be visually inspected prior to re-starting works to confirm the absence of entrapped wildlife. This mitigation is captured as measure **D-BD-023** of the **REAC**.
- 5.4.16. Escape measures will be discussed and agreed with an appointed ECoW to ensure they are suitable for the size of void and wildlife that may become trapped. If deemed appropriate, the ECoW may enforce additional measures, such as the installation of temporary exclusion fencing around the void to prevent entry (measure **D-BD-023** of the **REAC**).
- 5.4.17. In addition to the above, any exposed tunnels or pipes will also be blocked overnight to prevent entry by otter or other wildlife.
- 5.4.1. Following the implementation of the above mitigation measures, no adverse impact on the mortality of otters is likely to occur.

## **BIRDS**

- 5.4.2. To prevent disturbance from noise during construction at the River Dee trenchless crossing, temporary acoustic barriers will be considered around significant noise producing plant that are in close proximity to sensitive receptors (measure **D-NV-005** of the **REAC**). The locations of these screens will be optimised for acoustic mitigation whilst considering other potential impacts.
- 5.4.3. The location and design of the temporary acoustic barriers will be detailed in conjunction with the Landscape Architect to ensure impacts upon landscape character and visual amenity are avoided, and effects are prevented on the bird species identified in the **HRA**.
- 5.4.4. Noise and vibration monitoring will be carried out during the Construction Stage at the River Dee trenchless crossing, at locations that will be stipulated in the NVMP (measure **D-NV-013** of the **REAC**). As part of the Plan, a set of representative monitoring locations will be agreed along with actions for the Construction Contractor when the likelihood of significant effect is triggered.
- 5.4.5. The NVMP will identify the location for Continuous 24-hour noise monitoring, with trigger and notification capabilities, that will be implemented by the Construction Contractor(s) at the River Dee trenchless crossing, where there is

a likelihood of significant effects outside of core hours (8am to 6pm Monday to Friday (excluding bank holidays) and from 8am to 1pm on Saturdays)).

- 5.4.6. The monitoring will enable the investigation of potential complaints if raised. The specific monitoring locations and methodology will be agreed with the Local Planning Authority and will form part of the NVMP and Section 61 applications in relation to the River Dee trenchless crossing.
- 5.4.7. The implementation of these measures will prevent disturbance of redshank and the bird assemblage qualification of the Dee Estuary SPA/Ramsar from noise generated during construction at the River Dee trenchless crossing.

## **HABITATS**

- 5.4.8. At the River Dee – during Pre-construction and construction- The lighting design will be developed at Detailed Design based on guidance for lighting with regards to protected species and approved by the LPA. Bespoke lighting designs will be prepared for works locations where 24-hour working is required. In the absence of secondary mitigation, construction could lead to effects of Moderate adverse significance (Significant)
- 5.4.9. Mitigation measures for construction will be defined as part of the development of the Detailed Design. Further information relating to mitigation measures will be contained within the detailed **Construction Environment Management Plan (CEMP)** to be produced by the Construction Contractors, as included as a Requirement of the Draft DCO.
- Noise screening methods for works around the River Dee, if required, to reduce noise disturbance to qualifying bird species (namely redshank); and
  - Best practice measures to be followed during construction in relation to pollution prevention.
- 5.4.10. The above mitigation measures are captured within the **REAC** and would be secured and implemented within the approved **CEMP (OCEMP)**.
- 5.4.11. The implementation of these measures will prevent disturbance of redshank and the bird assemblage qualification of the Dee Estuary SPA/Ramsar from lighting during construction at the River Dee trenchless crossing.

## **5.5. RESIDUAL EFFECTS**

- 5.5.1. As reported in the **HRA** supporting the Marine Licence application, following the implementation of the control measures identified **Section 5.4**, in the **REAC**, and **OCEMP** there would be no adverse effects from emissions or deposition of dust, noise and vibration, and disturbance from artificial lighting.
- 5.5.2. Following the implementation of the mitigation measures described in **Section 5.4**, it is concluded that the Proposed Development would not adversely affect biodiversity receptors, and the integrity of the European Sites either alone or in-combination.

## 6. HABITATS REGULATION ASSESSMENT

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### 6.1. SUMMARY OF FINDINGS

- 6.1.1. A **Habitats Regulations Assessment - Information to Inform an Appropriate Assessment** has been prepared in relation to the Proposed Development.
- 6.1.2. Works associated with the Proposed Development are detailed in **Section 2**.
- 6.1.3. During the screening assessment, the following LSE were identified as a result of the Proposed Development:
- adverse air quality effects on the various qualifying features of the River Dee and Bala Lake/Afon Dyfrdwy a Llyn Tegid SAC associated with dust deposition;
  - loss of functionally linked otter habitat and mortality of otter associated with the River Dee and Bala Lake/Afon Dyfrdwy a Llyn Tegid SAC;
  - disturbance and fragmentation to qualifying fish species of the River Dee and Bala Lake/Afon Dyfrdwy a Llyn Tegid SAC and Dee Estuary/Aber Dyfrdwy SAC as a result of lighting during construction around the River Dee;
  - disturbance of redshank and the bird assemblage qualification of the Dee Estuary SPA/Ramsar as a result of lighting and noise during construction around the River Dee.
- 6.1.4. Potential in-combination effects with eight Other Developments were also identified, primarily as a result of disturbance to qualifying species of the European Sites.
- 6.1.5. As LSE were identified during the screening stage, further assessment of the potential for adverse effects on the integrity of the European Sites was undertaken (Stage 2: AA). At the AA stage, avoidance and mitigation measures designed to reduce harm to European Sites were considered. Mitigation measures identified include (in summary):
- Best practice measures to be followed during construction in relation to dust deposition;
  - Pre-commencement surveys to update baseline information relating to otter, the implementation of avoidance and mitigation measures if holts or resting places are identified or, if impacts are unavoidable, the implementation of an EPS licence obtained from the relevant statutory body;
  - Measures to avoid entrapment of otters in voids, trenches or pipes;
  - Appropriate lighting design to avoid or reduce impacts of light spill around the River Dee on birds and fish;
  - Noise screening methods for works around the River Dee, if required, to reduce noise disturbance to qualifying bird species (namely redshank); and

- Best practice measures to be followed during construction in relation to pollution prevention.

6.1.6. The above mitigation measures are captured within the **REAC** and would be secured and implemented within the Outline Construction Environmental Management Plan (**OCEMP**).

6.1.7. Following the implementation of the above mitigation measures, **it is concluded that the Proposed Development would not adversely affect the integrity of the European Sites either alone or in-combination.**

## 7. WATER FRAMEWORK DIRECTIVE ASSESSMENT

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### 7.1. SUMMARY OF FINDINGS

- 7.1.1. Most of the potential impacts arising from the Proposed Development on the River Dee watercourse would be during the Construction Stage. Consequently, those impacts would primarily be temporary and with only localised impacts.
- 7.1.2. Design and construction methods have been adopted where practicable to eliminate, reduce, and mitigate potential impacts as far as practicable.
- 7.1.3. The Proposed Development would not prevent the achievement of WFD mitigation measures set for the Dee (N. Wales) Transitional water body, and Dee River Basin Management Plan.
- 7.1.4. The Proposed Development has been assessed to have no impact on the Dee Permo-Triassic Sandstone and the Dee Carboniferous Coal Measures WFD water bodies.
- 7.1.5. Construction impacts would be mitigated through best-practice measures. A CEMP will be produced and implemented throughout the Proposed Development and during all construction activities. The CEMP will be produced by the Construction Contractor prior to the commencement of construction and will specify measures to avoid/control impacts on the natural environment. The CEMP will be informed by the measures detailed within the **OCEMP** and **REAC** that accompany the Marine Licence application.
- 7.1.6. As WFD overall status is contingent on the status of associated protected areas, namely the River Dee and Bala Lake /Afon Dyfrdwy A Llyn Tegid SAC, the final conclusion on overall status for the Proposed Development is dependent on the outcome of the HRA. The **HRA** has concluded that following the implementation of the measures detailed within the **OCEMP** and **REAC**, the Proposed Development would not adversely affect the integrity of the European Sites, either alone, or in-combination.
- 7.1.7. Therefore, **it is concluded that, with the proposed mitigation in place, the WFDa has demonstrated that the Proposed Development will not compromise the objectives of WFD and will not have a negative impact on the ability of the WFD waterbody to achieve compliance.**

