# HYNET PROJECT-WIDE ENVIRONMENTAL EFFECTS REPORT

## HyNet Carbon Dioxide Transportation and Storage Project - Offshore

Marine and Coastal Access Act 2009, and Regulation 14 of the Marine Works (Environmental Impact Assessment) (EIA) Regulations 2007 (as amended)

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# TABLE OF CONTENTS


**1. INTRODUCTION ..... 1**

1.1. Purpose of this Document ..... 1

1.2. The Project ..... 1

1.3. The Developer ..... 2

1.4. Need for the Project ..... 2

**2. HYNET PROJECT DESCRIPTION ..... 5**

2.1. Introduction ..... 5

2.2. The HyNet Carbon Dioxide Tranportation and Storage Project - Offshore ..... 5

2.3. Point of Ayr Terminal ..... 8

2.4. Onshore Carbon Dioxide Transportation Pipeline ..... 9

2.5. Trenchless Crossing of River Dee ..... 10

2.6. Protos Carbon Dioxide Spur Pipeline ..... 11

2.7. Runcorn Carbon Dioxide Spur Pipeline ..... 11

2.8. Padeswood Carbon Dioxide SPur Pipeline ..... 12

2.9. HyNet North West Hydrogen Pipeline ..... 13

**3. PERMITTING AND ENVIRONMENTAL ASSESSMENT ..... 14**

3.1. Permitting Overview ..... 14

3.2. Environmental Impact Assessment ..... 15

3.3. Habitats Regulations Assessment ..... 15

3.4. Method for Assessment of Effects ..... 22

3.5. Mitigation ..... 23

4.2. Offshore Platforms ..... 28

4.3. Repurposing Existing Inter-Field Pipelines ..... 28

4.4. Offshore Power and Fibre Optic Cable ..... 29

4.5. Summary of Environmental Effects and Project Specific Mitigation ..... 31

**5. POINT OF AYR TERMINAL ..... 59**

5.1. Components ..... 59

5.2. Site Location ..... 60

5.3. Construction Compounds ..... 60

5.4. Construction Method ..... 61

5.5. Summary of Environmental Effects and Project Specific Mitigation ..... 61

**6. ONSHORE CARBON DIOXIDE TRANSPORTATION PIPELINE ..... 73**

6.1. Components ..... 73
6.2. Route Overview ..... 73
6.3. Construction ..... 74
6.4. Operation and Maintenance ..... 75
6.5. Summary of Environmental Effects and Project Specific Mitigation ..... 76
**7. TRENCHLESS CROSSING OF THE RIVER DEE ..... 88**
7.1. Components ..... 88
7.2. Route Overview ..... 88
7.3. Construction ..... 89
7.4. Operation and Maintenance ..... 91
7.5. Summary of Environmental Effects and Project Specific Mitigation ..... 91
**8. PROTOS CARBON DIOXIDE SPUR PIPELINE ..... 93**
8.1. Components ..... 93
8.2. Route Overview ..... 93
8.3. Construction ..... 94
8.4. Operation and Maintenance ..... 94
8.5. Summary of Environmental Effects and Project Specific Mitigation ..... 95
**9. RUNCORN CARBON DIOXIDE SPUR PIPELINE ..... 99**
9.1. Components ..... 99
9.2. Route Overview ..... 99
9.3. Construction ..... 100
9.4. Decommissioning ..... 102
9.5. Summary of Environmental Effects and Project Specific Mitigation ..... 102
**10. PADESWOOD CARBON DIOXIDE SPUR PIPELINE ..... 110**
10.1. Components ..... 110
10.2. Route Overview ..... 110
10.3. Construction ..... 111
10.4. Operation and Maintenance ..... 112
10.5. Summary of Environmental Effects and Project Specific Mitigation ..... 113
**11. HYNET NORTH WEST HYDROGEN PIPELINE ..... 123**
11.1. Components ..... 123
11.2. Route Overview ..... 124
11.3. Construction ..... 126
11.4. Operation and Maintenance ..... 127

11.5. Decomissioning ..... 127
11.6. Summary of Environmental Effects and Project Specific Mitigation ..... 127
**12. INTER-PROJECT EFFECTS ..... 139**
**13. CONCLUSION ..... 151**

## FIGURES

Figure 6-1 – Onshore Carbon Dioxide Transportation Pipeline Route ..... 74
Figure 7-1 – River Dee Crossing ..... 88
Figure 10-1 – Padeswood Carbon Dioxide Spur Pipeline Route ..... 111

## TABLES

Table 3.1 – Permitting Overview ..... 14
Table 3.2 – Summary of HyNet Project interactions with European Sites ..... 19
Table 4-1 - Cables ..... 29
Table 4-2 - Third part cable crossing ..... 30
Table 4-3 - Overview of wells ..... 31
Table 4-4 – Summary of offshore transportation and storage project – Construction Phase ..... 32
Table 5-1 – Point of Ayr Terminal – Summary of Environmental Effects ..... 62
Table 6-1 – Onshore $CO_2$ Transportation Pipeline – Summary of Environmental Effects ..... 77
Table 7-1 – HDD Pipeline Underneath the River Dee – Summary of Environmental Effects ..... 92
Table 8-1 – Protos Pipeline Spur – Summary of Environmental Effects ..... 96
Table 9-1 — Runcorn Spur Pipeline Proposed Development Summary of Environmental Effects ..... 103
Table 10-1 – Padeswood Pipeline Spur – Summary of Environmental Effects ..... 114
Table 11-1 – Hydrogen Pipeline – Summary of Anticipated Environmental Effects ..... 128
Table 12-1 – Summary of Inter-Project Effects – Construction Phase ..... 140
Table 12-2 – Summary of Inter-Project Effects – Operational Phase ..... 149
Table 13-1 – Summary of Environmental Assessment Conclusions ..... 153

## ANNEXURES

**ANNEX A**
**MAPS OF EUROPEAN SITES ACROSS HYNET NORTH WEST PROJECTS**

# EXECUTIVE SUMMARY

This HyNet Project-Wide Enviroinmental Effects Report provides a summary of the main environmental effects arising from the various offshore and onshore elements of the HyNet Carbon Dioxide Transportation and Storage Project. The information has been drawn from the environmental assessments carried out for: the Offshore $CO_2$ Transportation and Storage applications; the onshore Point of Ayr Terminal planning application; HyNet Carbon Dioxide Pipeline Development Consent Order (DCO) application; Trenchless Crossing of the River Dee Marine License; the Protos Carbon Dioxide Spur Pipeline, Runcorn Carbon Dioxide Pipeline, and Padeswood Spur Pipeline planning applications; and HyNet North West Hydrogen Pipeline DCO.

The Combined Non Techincal Summary collates the information from each project including environmental effects, proposed mitigation, and residual effects whilst also reviewing the background of the projects and the project proposals. The information from each of the individual projects has been used to determine if there any inter-project and cumulative effects arising from any of the Projects, in respect of the relevant Environmental Impact Assessment Regulations, and Habitats Regulations.

Each Proposed Development is currently at a different stage within the planning process and therefore more detailed information is presented for certain project elements. The proposed routes and locations of project infrasturcitire have, where practicable, been carefully selected to minimise environmental effects, and mitigation measures have been embedded into the design. Where these measures were not sufficient to fully mitigate significant environmental effects, additional mitigation measures have been identified.

The Proposed Hynet North West Hydrogen Pipeline Development Constent Order is currently at the Preliminary Envrionmental Information Report stage therefore, further assessments will be carried out and reported in the Environmental Statement with the DCO application. However, predicted envrionmental effects and mitigation measures have been reviewed within the Preliminary Envrionmental Information Report and summarised within the Non Technical Summary.

Both the Runcorn Carbon Dioxide Pipeline and Padeswood Spur Pipeline Proposed Developments are at Scoping Stage and an Environmental Statement will be prepared for these Projects in due course.

The Protos Carbon Dioxide Spur Pipeline was submitted as a Town and Country Planning Act application and includes a variety of environmental reports all of which concluded that with approriate mitigation measures in place, no significant environmental effects are anticpated.

Inter-project effects have been identified between the Onshore Carbon Dioxide Pipeline, the Point of Ayr Terminal, the Hydrogen Production Facility and the Offshore $CO_2$ Transport and Storage based on Inter-Project Effect Assessments undertaken to date. The other projects are currently at early stages of the planning process and therefore have not yet considered inter-project effects. However, once the Projects get into the further deatiled stages, the inter-project effects will be considered and reported.

# 1. INTRODUCTION

## 1.1. PURPOSE OF THIS DOCUMENT

1.1.1. This document has been prepared at the request of Natural Resources Wales (NRW) to support a Marine Licence Application for the installation, operation, and maintenance of the HyNet Carbon Dioxide Transportation and Storage Project – Offshore (the Proposed Development).

1.1.2. The Proposed Development comprises the offshore elements of the wider HyNet Carbon Dioxide Transportation and Storage Project (hereafter referred to as 'the HyNet Project').

1.1.3. The HyNet Project will include infrastructure to produce and distribute low carbon hydrogen. A schematic of the HyNet Project (orange line), within the HyNet North West Project, is illustrated in Figure 1-1. It is a linear infrastructure project in Wales and England, with both onshore and marine elements.

1.1.4. The purpose of this document is to provide a summary of the onshore and marine elements in both Wales and England and give an overview of their combined environmental effects. The summaries of the environmental assessments for each HyNet Project component are presented in Sections 4-11 of this report. Inter-project effects are presented in Section 12.

1.1.5. More detailed information on the HyNet Project and the environmental assessments can be found on the website (www.hynethub.com) and within the permit applications and supporting documentation submitted to the respective determining authorities.

## 1.2. THE PROJECT

1.2.1. The HyNet Project is made up of several different elements. Together, these will provide the infrastructure to produce, transport and store low carbon hydrogen across North Wales and the North West of England. There will also be the infrastructure to capture, transport and lock away carbon dioxide ($CO_2$) emissions.

1.2.2. The HyNet Project aims to reduce $CO_2$ emissions from being released into the atmosphere and stimulate economic growth in the North West of England, North Wales, and further afield.

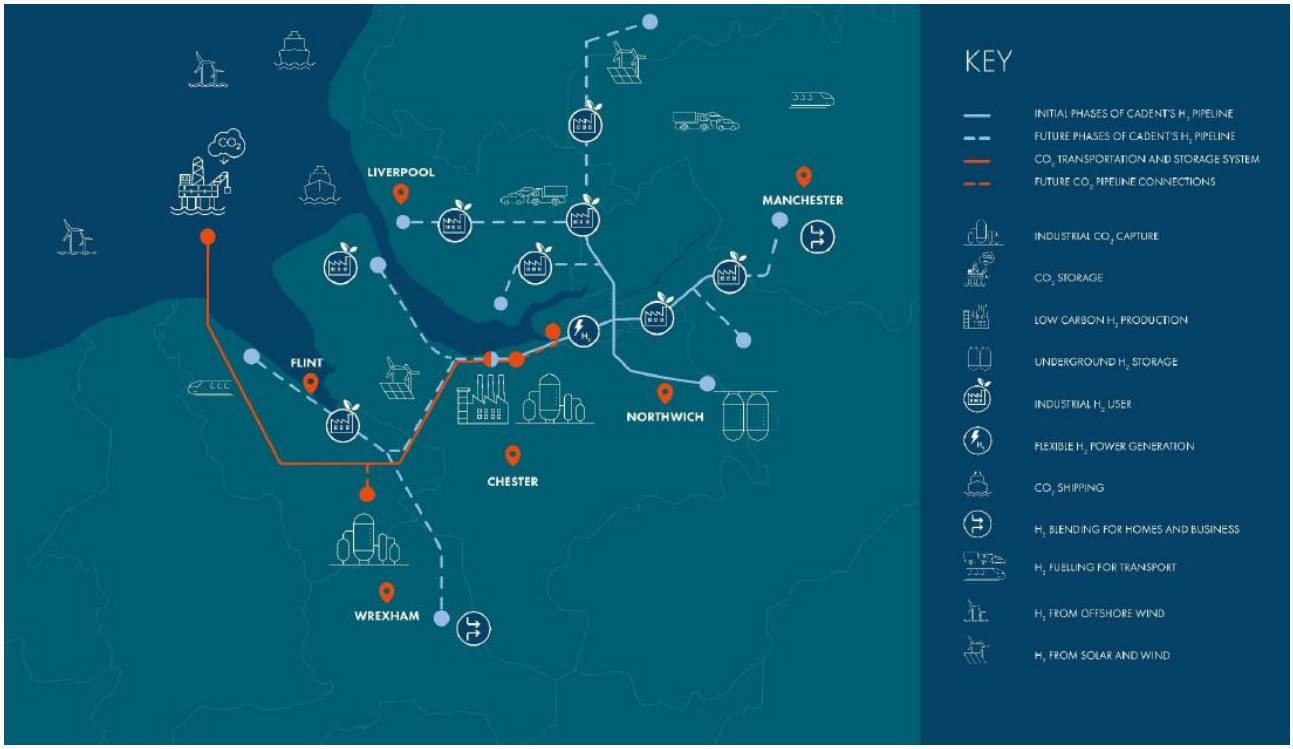


**Figure 1-1 Indicative representation of the HyNet**

1.2.3. HyNet involves both upgrading and re-purposing existing infrastructure, as well as developing new infrastructure. This includes underground pipelines, hydrogen production plants and storage facilities. HyNet will be developed in phases with each phase being subject to separate environmental assessments and applications for consent.

1.2.4. A representation of the wider HyNet project, for which the proposed development forms a part of, is shown in Image 1 - Indicative representation of HyNet below.

## 1.3. THE DEVELOPER

1.3.1. The Applicant is an integrated energy company committed to developing a fully decarbonised portfolio of products and services by 2050, creating value for their stakeholders and contributing to a socially just energy transition (Eni, 2021). As a global energy company, Eni is active at every stage of the value chain, from natural gas and oil to co-generated electricity and renewables.

## 1.4. NEED FOR THE PROJECT

1.4.1. Climate change is a global issue, resulting from greenhouse gas (GHG) emissions released into the atmosphere, largely due to human activity. Evidence of the effects of climate change include widespread and rapid changes in the atmosphere, ocean, cryosphere, and biosphere (IPCC, 2021).

1.4.2. The United Kingdom (UK) Parliament announced a climate change emergency in May 2019, publicly declaring concern over the findings around climate change and its consequences. The Climate Change Act 2008 (2050 Target Amendment) Order 2019 introduced a legally binding commitment that the net UK carbon account for the year 2050 must be at least 100% lower than the 1990 baseline i.e. 'net zero'. The Committee on Climate Change (CCC10) concluded that net zero is (CCC, 2019):

- necessary to respond to the overwhelming evidence of the role of GHGs in driving global climate change.
- feasible as the technologies and approaches to deliver net zero are understood and can be implemented with strong government leadership; and
- cost-effective given the falls in the costs of key technologies that permit net zero.

1.4.3. To achieve the UK Net Zero target, it is thought that industrial emissions in the UK will need to reduce by at least two thirds by 2035, and at least 90% by 2050, and to achieve this, the deployment of carbon capture and storage (CCS) is essential (CCC, 2019). CCS refers to a set of processes that capture $CO_2$ from waste gases produced at industrial or power generation facilities and permanently store it in offshore geological storage sites. CCS is proven technology and is already in use around the world (Global CCS Institute, 2021).

1.4.4. Forecasts of the UK's future energy scenarios require CCS to be utilised with industrial processes where there are limited available alternatives to fossil fuels e.g. producing steel, concrete, and chemicals (BEIS, 2022a; IEA, 2020). Power plants with CCS provide reliable lower carbon generation capacity and are intended to reduce emissions compared to unabated plants by 90% or more. Power plants equipped with post-combustion CCS could provide flexible generation that is able to ramp up or down to meet demand and balance variable generation from renewable electricity sources (National Grid, 2020).

1.4.5. In November 2020, the UK Government published the Ten Point Plan for a Green Industrial Revolution, to decarbonise the economy with commitments focused on driving innovation, boosting export opportunities, and generating green jobs and growth across the country to level up regions of the UK. Included in the Plan was the first UK commitment to deploy CCS in two industrial clusters by the mid-2020s, and a further two clusters by 2030 with an ambition to capture 10 million tonnes per annum (MtPA) $CO_2$ by 2030 (UK Government, 2020). The UK Government is committed to investing up to £1 billion to support the establishment of CCS in four industrial clusters in areas such as the North West, Wales, the Humber, North East, and Scotland (UK Government, 2021). CCS infrastructure is needed to decarbonise the industrial areas of the North West proposed by HyNet.

1.4.6. As part of encouraging CCS cluster development, the Government established a cluster sequencing process in February 2021, which seeks to provide industry with the certainty to deploy the technology at pace and at scale (BEIS, 2021a). In October 2021, the UK Government published the UK Net Zero Strategy, which set out to at least double the commitments from the UK Government's Ten Point Plan by aiming to capture between 20 and 30 MtPA of $CO_2$. In the same month, the Department for Business, Energy and Industrial Strategy (BEIS) (now the Department for Energy Security and Net Zero (DESNZ)) confirmed two Track-1 clusters, i.e. clusters expected to be operational by mid-2020s and having the first opportunity to receive support from the government's CCS Programme.

1.4.7. HyNet is one of the two selected Track-1 clusters and includes the Proposed Development (Section 1.2). The Proposed Development aims to transport and store around 4.5 MtPA $CO_2$, and 109 Mt by the end of the 25-year life of the Proposed Development. Achieving these aims bolsters the UK's leadership in the energy transition and the emerging global low-carbon and hydrogen market and plays a major role in the desire to level up across the country. The Development is critical to delivery of the wider HyNet Project by providing the onshore and offshore infrastructure for transporting $CO_2$ from the industrial emitters in the North West of England to the Liverpool Bay storage sites.

# 2. HYNET PROJECT DESCRIPTION

## 2.1. INTRODUCTION

2.1.1. The HyNet Project elements considered in this report are:

- The HyNet Carbon Dioxide Transportation and Storage Project – Offshore (The Marine Licence, and Carbon Storage Permit applications);
- The Point of Ayr Terminal (Town and country Planning Act application);
- Onshore Carbon Dioxide Transportation Pipeline (Planning Act 2008 DCO application);
- Trenchless Crossing of River Dee (Marine Licence application);
- Protos Carbon Dioxide Transportation Pipeline (Town and country Planning Act application)
- Runcorn Carbon Dioxide Transportation Pipeline (Town and country Planning Act application)
- Padeswood Carbon Dioxide Transportation Pipeline (Town and country Planning Act application)
- Hydrogen Pipeline (Planning Act 2008 DCO application)

## 2.2. THE HYNET CARBON DIOXIDE TRANPORTATION AND STORAGE PROJECT - OFFSHORE

2.2.1. The Proposed Development is in the CS004 $CO_2$ Appraisal and Storage Licence area, approximately 12 km to the north of the Welsh coastline and 2 km west of the English coastline. The licence area covers approximately 576.82 $km^2$ and encompasses the depleted hydrocarbon reservoirs of the Hamilton, Hamilton North, and Lennox fields.

2.2.2. The Proposed Development infrastructure will be located within the 'Eni development area' defined by both the Licence area (CS004), and the pipeline and cable corridor connecting the Point of Ayr (PoA) Terminal to Douglas Offshore Platform (OP) (up to Mean High Water Springs (MHWS)), as shown by the red line in Figure 2-1. The corridor shore approach is located to the north of Talacre in Flintshire, Wales, near the mouth of the Dee Estuary.

2.2.3. Within the Eni Development Area, also shows a black, dotted, and dashed line, which identifies the 'area of project physical works. It is within this area that the works required for the Proposed Development will be carried out. This area has been defined as it represents a reasonable worst-case geographical extent within which each of the project activities will take place. This is, of course, not the same as the worst-case extent of the resulting impacts and effects of the works, which can extend outside of this area. For example, underwater noise

from installation of the piles at the new Douglas platform can impact fish and marine mammals several kilometres from the noise source.

2.2.4. The key offshore infrastructure of the Proposed Development will include both new and re-purposed existing infrastructure.

2.2.5. The elements of offshore infrastructure that comprise the Proposed Development will include:

- Utilisation of the existing Hamilton Main, Hamilton North, and Lennox reservoirs for the injection of 109 Mt of $CO_2$ over a 25-year period for permanent geological storage. The storage would be divided between the three reservoirs, as follows: Hamilton Main, 53 Mt; Hamilton North, 18 Mt; and Lennox 38 Mt.
- Drilling and re-completion of injection wells by side-tracking existing production wells. This includes drilling and recompletion operations, all of which will be within the existing footprint (template) of each platform.
- Installation of a new Douglas CCS platform to replace the existing Douglas Process platform to receive $CO_2$ from the onshore PoA Terminal and distribute $CO_2$ to the Hamilton Main, Hamilton North, and Lennox wellhead platforms and when necessary, provide heating to the $CO_2$ stream. Installation of the new Douglas CCS platform will include up to eight driven piles.
- Installation of new sections of pipeline, concrete mattresses, and external rock protection to connect the new Douglas CCS platform and the existing subsea natural gas pipelines.
- Installation of new topsides on the Hamilton Main, Hamilton North, and Lennox wellhead platforms to receive and inject $CO_2$ into the depleted hydrocarbon reservoirs.
- Repurposing of the existing subsea natural gas pipelines for their change of use from hydrocarbon to $CO_2$ service.
- Implementation of a Monitoring Plan. This includes the drilling of two new monitoring wells, one at Hamilton North and one at Hamilton Main. Additional monitoring wells will be created from the recompletion of existing wells within the existing footprint (template) of each platform: one monitoring well created by side-tracking an existing well in Lennox; and two sentinel wells, one in Hamilton North and one in Lennox.

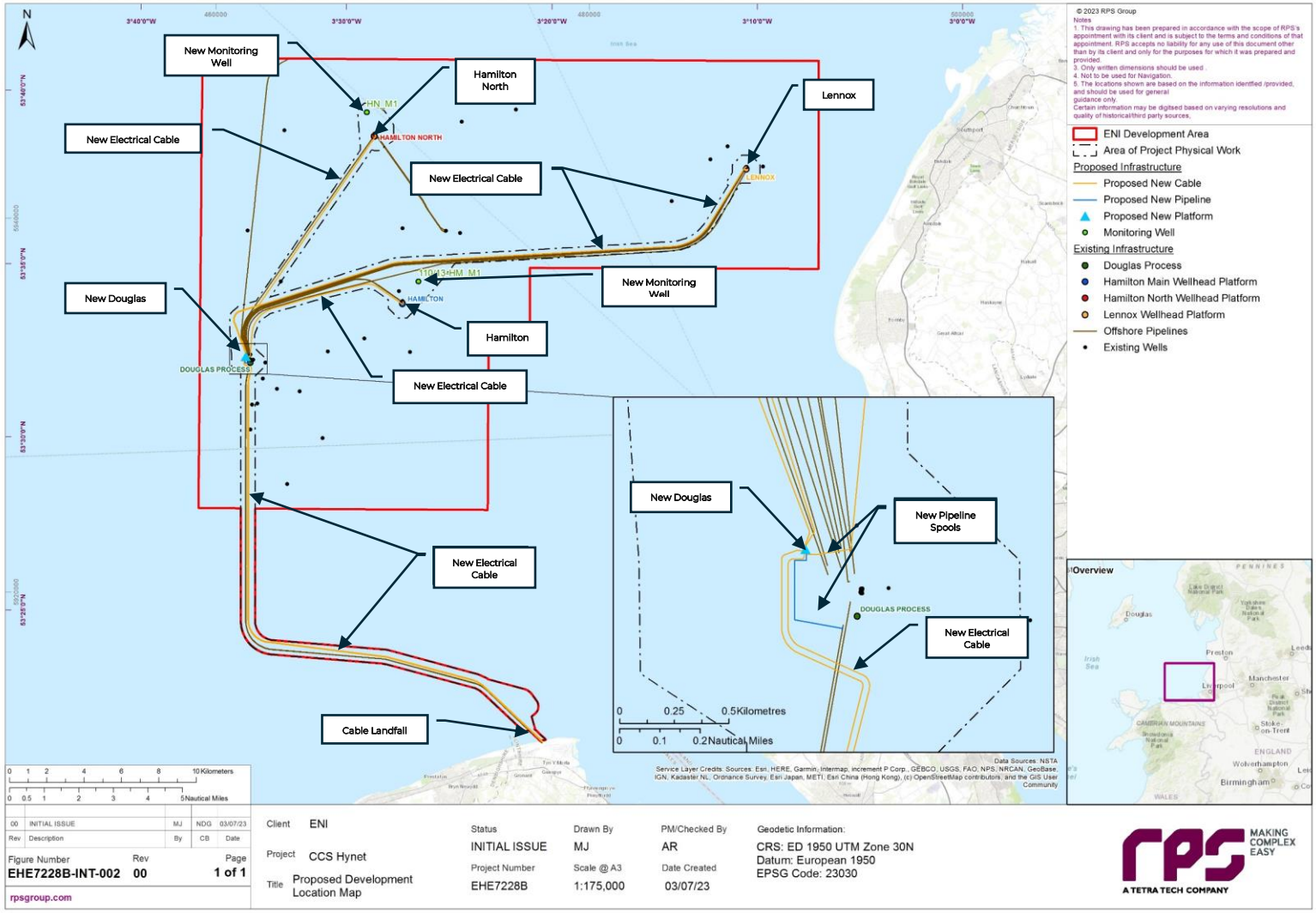


**Figure 2-1** Location of the HyNet Carbon Dioxide Transportation and Storage Project - Offshore

- Installation of two submarine 33 kilovolt (kV) power cables, with integrated fibre-optic cable connections (35 km from PoA Terminal onshore to the modified Douglas platform, including within the intertidal/foreshore area up to MHWS, within Welsh waters only).
- Installation of new submarine 33 kV power cables with integrated fibre-optic connecting the modified Douglas platform with the Hamilton Main (12 km; 33 kV), Hamilton North (15 km; 33 kV) and Lennox (35 km; 33 kV) platforms.
- Installation of concrete mattresses and external cable protection, at crossings of existing cables, and in areas where cable burial is not deemed feasible, or as a remedial secondary protection measure if the target cable depth of lowering cannot be achieved.

2.2.6. All the above infrastructure will be confined within the Eni Development Area shown in Figure 2-1 and is also described in detail in the Marine Licence and Storage Permit applications.

2.2.7. The offshore components are described further in Section 4.

## 2.3. POINT OF AYR TERMINAL

2.3.1. The TCPA development at Point of Ayr Terminal comprises the following:

- retention and use of existing structures, plant and ancillary development (including access roadway and landscaping) forming the Point of Ayr gas terminal for the transport of $CO_2$ and the demolition/removal of redundant structures at the terminal.
- construction and use of new infrastructure required for $CO_2$ service at the Point of Ayr gas terminal.
- retention and use of the existing 20" diameter gas pipeline, condensate pipes and associated cables from the Point of Ayr gas terminal to the Mean Low Water Spring mark for the transport of $CO_2$ and associated activities.
- removal of the Shut Down Valve compound associated with the existing 20" diameter gas pipeline from the Point of Ayr gas terminal to the Mean Low Water Spring mark and appropriate restoration/remediation.
- construction and use of two 33kV electricity and fibre optic connections from Point of Ayr gas terminal to the Mean Low Water Spring mark; and
- construction and use of two kiosks and associated fenced compounds located on the line of the proposed 33kV electricity and fibre optic connections at land west of Station Road, Talacre.

2.3.2. The components are described further in Section 5.

## 2.4. ONSHORE CARBON DIOXIDE TRANSPORTATION PIPELINE

### PIPELINE

2.4.1. Approximately 36km of new underground pipeline from Ince in England to Flint in Wales will be constructed, as shown by the orange line in Figure 2-2. This will transport the $CO_2$ captured as part of the HyNet project. The route passes through the local authority areas of Cheshire West and Chester Council, and Flintshire County Council. It predominantly crosses agricultural fields and rural land. Most of the new pipeline will be 36-inch in diameter, with some 20-inch and 24-inch sections. A fibre optic telecommunications cable will be installed alongside the new pipeline to connect the above ground infrastructure (see sections below on 'Above Ground Installations' and 'Block Valve Stations'). At Flint, the new pipeline will connect to an existing underground pipeline (shown on Figure below – The proposed development) which will be repurposed to allow the onward flow of $CO_2$ to the Point of Ayr Terminal. The existing pipeline currently transports natural gas, therefore the DCO Application seeks consent to allow this existing pipeline to be repurposed to transport $CO_2$.

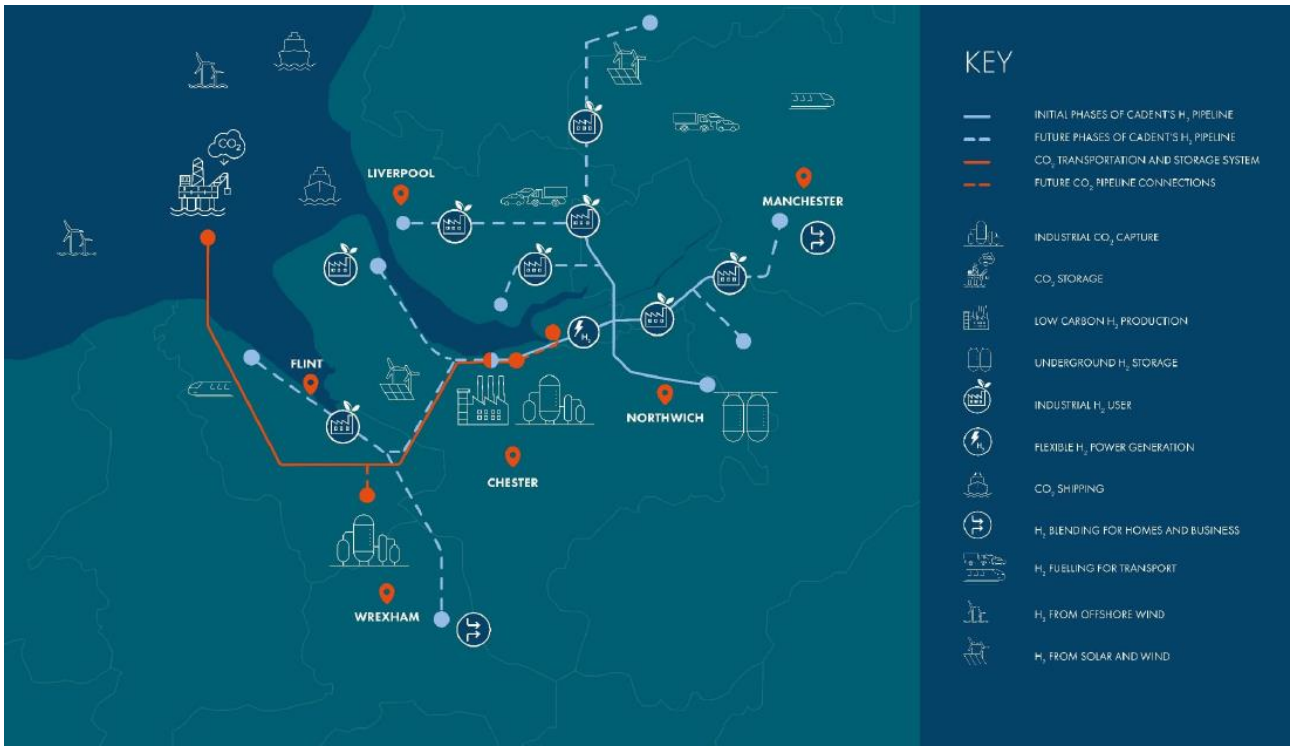


**Figure 2-2** Indicative representation of the HyNet Project

### ABOVE GROUND INSTALLATIONS

2.4.2. Four Above Ground Installations (AGIs) are required to connect the $CO_2$ capture facilities in the industrial areas to the new pipeline. The AGIs will each be fenced areas with footprints (including the earthworks beyond the fence line) up to approximately 85m x 90m and will have an access

track joining them to the existing road network. Visible permanent equipment above ground will be up to 5m high, with various other equipment above and below ground to serve maintenance and operation functions. The four proposed AGIs are located at:

- Ince - near Elton, England.
- Stanlow – near Thornton-le-Moors, England.
- Northop Hall – near Northop, Wales; and
- Flint – near Oakenholt, Wales.

**BLOCK VALVE STATIONS**

2.4.3. Six Block Valve Stations (BVS) are required to enable sections of the new pipeline system to be isolated for maintenance purposes or in an emergency. The block valves will be installed below ground level, with only limited above ground visible elements, including secure chamber access covers and an electrical and instrumentation kiosk. The Block Valve Stations will also include security lighting. Each Block Valve Station will be located within a fenced compound within an area of approximately 35m x 30m and will be accessible via a new access track connecting to the local road network.

Each BVS will also include a new access track connecting to the existing road network. Of the six BVSs, three will be along the new pipeline with two in England and one in Wales. The locations are as follows:

- Rock Bank – near Backford, England.
- Mollington – near Mollington, England; and
- Aston Hill – near Mancot and Pentre, Wales.

2.4.4. The remaining three Block Valve Stations will be installed along the existing 24" natural gas pipeline which spans approximately 24km between the PoA Terminal and the existing Connah's Quay Power Station. The locations are:

- Cornist Lane – near Flint, Wales.
- Pentre Halkyn – near Pentre Halkyn and Brynford, Wales; and
- Babell – near Babell and Ysceifog, Wales.

2.4.5. Further details of the Padeswood $CO_2$ Spur Pipeline and its environmental effects are provided in Section 6.

## 2.5. TRENCHLESS CROSSING OF RIVER DEE

2.5.1. 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).

2.5.2. The marine licensable activities associated with the Proposed Development relate only to those elements that will be carried out and

installed below Mean High Water Springs (MHWS). For the Proposed Development this would be the approximately 75 m in length bored section of pipe installed below the Riverbed between the MHWS mark on each bank.

2.5.3. Further details of the trenchless crossing of the River Dee and its environmental effects are provided in Section 7.

## 2.6. PROTOS CARBON DIOXIDE SPUR PIPELINE

2.6.1. The Protos $CO_2$ Spur Pipeline would connect to the Onshore $CO_2$ Transportation Pipeline. It would involve the construction of a new $CO_2$ Spur Pipeline and Above Ground Installation (AGI) to serve Protos Resource Recovery Park, and comprises the following:

- Protos AGI. The AGI connects to the industrial emitter (Encyclis's Protos Energy Recovery Facility) and enables the safe and efficient operation of the pipeline, as well as routine inspections and maintenance. The preferred location for the Protos AGI is a small parcel of greenfield land set back from Marsh Lane, on land owned by PEEL NRE. The AGI would include a control kiosk which would provide electrical and instrumentation equipment for distributing power and for control and monitoring of the system. In addition, associated infrastructure would be provided which would include above and below ground auxiliary pipework and valves, instrumentation and sensors, cable trays, and electrical transformers.
- A mixed above ground and buried pipeline, which would be approximately 1.1km in length. The pipeline would carry $CO_2$ and connect the Protos AGI to the similar AGI at Ince.
- Temporary Construction Compound(s).

2.6.2. To gain consent to build the Proposed Development, Liverpool Bay CCS Limited (the Applicant) has submitted a planning application through the Town and Country Planning Act 1990 (as amended) to Cheshire West and Chester Council in March 2024. The Ince AGI forms part of the HyNet Carbon Dioxide Pipeline DCO application and will not form part of the Protos Spur Pipeline planning application.

2.6.3. The Proposed Development is now in its determination period, with Cheshire West and Chester Council due to come to a decision on the planning application later in 2024.

2.6.4. Further details of the Protos $CO_2$ Spur Pipeline and its environmental effects are provided in Section 8.

## 2.7. RUNCORN CARBON DIOXIDE SPUR PIPELINE

2.7.1. The Runcorn $CO_2$ Spur Pipeline would connect the Viridor Energy from Waste facility's new carbon capture plant in Runcorn with the Onshore $CO_2$ Transportation Pipeline at Northop Hall (Flintshire) AGI. The Runcorn $CO_2$ Spur Pipeline would include:

- Runcorn AGI. The AGI will comprise a fenced compound housing equipment designed to receive $CO_2$ from the Viridor facility and ensure the safe and efficient operation of the pipeline. The AGI would be located on industrial land adjacent to the Viridor Energy from Waste plant.
- A pipeline transporting $CO_2$, connecting the Runcorn AGI to the Ince AGI (the Ince AGI has already been granted development consent through the Onshore $CO_2$ Transportation Pipeline DCO). The pipeline would typically be installed above-ground through industrial land and buried through agricultural land. The initial design suggests that the pipeline would be approximately 10km in length.
- Additional equipment at Ince AGI.
- Temporary construction compounds.

2.7.2. To gain consent to build the Proposed Development, Liverpool Bay CCS Limited (the Applicant) will submit a planning application through the Town and Country Planning Act 1990 (as amended) to Cheshire West and Chester Council and Halton Borough Council in January 2025. The Ince AGI already has development consent from the Onshore $CO_2$ Transportation Pipeline DCO.

2.7.3. Further details of the Runcorn $CO_2$ Spur Pipeline and its environmental effects are provided in Section 9.

## 2.8. PADESWOOD CARBON DIOXIDE SPUR PIPELINE

2.8.1. The Padeswood $CO_2$ Spur Pipeline would connect the Heidelberg Materials (formerly known as Hanson) cement works at Padeswood (Flintshire) with the Onshore $CO_2$ Transportation Pipeline at Northop Hall (Flintshire) AGI. The Padeswood $CO_2$ Spur Pipeline would include:

- Padeswood AGI. The AGI will allow for the safe and efficient operation of the pipeline, as well as routine inspections and maintenance. The AGI would be located within the Heidelberg Materials facility.
- A buried pipeline, which would be approximately 10km in length. The pipeline would transport $CO_2$ from the Padeswood AGI to the similar AGI at Northop Hall.
- Additional equipment at Northop Hall AGI.
- Temporary construction compounds.

2.8.2. To gain consent to build the Proposed Development, Liverpool Bay CCS Limited (the Applicant) will submit a planning application through the Town and Country Planning Act 1990 (as amended) to Flintshire County Council in January 2025. The Ince AGI already has development consent from the HyNet Onshore $CO_2$ Transportation Pipeline DCO.

2.8.3. Further details of the Padeswood $CO_2$ Spur Pipeline and its environmental effects are provided in Section 10.

## 2.9. HYNET NORTH WEST HYDROGEN PIPELINE

2.9.1. The HyNet North West Hydrogen Pipeline Project is a proposal by Cadent Gas Ltd to construct and operate the UK's first 100 per cent hydrogen pipeline. It will deliver hydrogen to multiple industrial users and power generators, taking hydrogen to gas blending points for introduction into the existing gas network.

2.9.2. The HyNet North West Hydrogen Pipeline Project is part of the wider 'HyNet North West' project that will produce, store and distribute hydrogen as well as capture and store carbon from industry in the North West of England and North Wales.

2.9.3. The HyNet North West Hydrogen Pipeline Project includes the construction, operation and maintenance of up to 125km of new pipeline to distribute hydrogen to industry and for blending with the gas network in the North West, and a number of Hydrogen Above Ground Installations plus Block Valves required to control the flow and pressure of hydrogen at key points along the proposed pipeline.

2.9.4. The HyNet North West Hydrogen Pipeline Project would connect to the Hydrogen Production Plant at the Essar Stanlow site as the source of hydrogen for onward distribution to the Network. The pipeline would continue to the Central Hub at the centre of the Network which serves as the connection and onward distribution point to the South, East and North corridors, which would extend to locations near Middlewich, Irlam, and St. Helens respectively. The location and proposed key components of the Project are shown in Figure 11-1.

2.9.5. Further details of the HyNet North West Hydrogen Pipeline Project and its environmental effects are provided in Section 11.

# 3. PERMITTING AND ENVIRONMENTAL ASSESSMENT

## 3.1. PERMITTING OVERVIEW

3.1.1. Permits are required for both onshore and offshore works in England and Wales. The statutory permits for the HyNet Project include those presented in Table 3.1.

Table 3.1 – Permitting Overview

| Component | Infrastructure elements | Consents required | Authorities |
|---|---|---|---|
| Offshore Wales and England | • $CO_2$ storage sites and associated infrastructure | • Storage Permit under The Energy Act 2008 through The Carbon Dioxide (Licensing etc.) Regulations 2010 | NSTA |
| Offshore Wales | • PoA to Douglas Electrical cables.<br>• External cable protection at crossings.<br>• Douglas jacket.<br>• Douglas topsides.<br>• Pipeline spools.<br>• 3 x Inter-platform cables. | • Marine license under the Marine and Coastal Access Act 2009.<br>• Consent to locate.<br>• Pipeline Work Authorisation (PWA). | NRW-MLT<br><br>OPRED |
| Offshore England | • 3 x Inter-platform electrical cables.<br>• 3x Satellite topsides. | • PWA<br>• Consent to locate. | OPRED<br>OPRED |
| Onshore Wales | • Retention and use of existing structures.<br>• Demolition and removal of redundant structures.<br>• New Structures of CCS at PoA | • Town & Countryside Planning Act 1990 | Flintshire County Council |
| Onshore Wales | • Block Valve Stations | • Planning Act 2008, Development Consent Order | Secretary of State for Energy Security and Net Zero |
| Onshore England | • $CO_2$ pipeline | • Planning Act 2008, Development Consent Order | Secretary of State for Energy Security and Net Zero |
| Onshore Wales | • $CO_2$ pipeline trenchless crossing of River Dee | • Marine license under the Marine and Coastal Access Act 2009 | NRW-MLT |
| Onshore England | • Protos $CO_2$ spur pipeline | • Town and Country Planning Act 1990 | Cheshire West and Chester Council |
| Onshore England | • Runcorn $CO_2$ spur pipeline | • Town and Country Planning Act 1990 | Cheshire West and Chester Council and Halton Borough Council |
| Onshore Wales | • Padeswood $CO_2$ spur pipeline | • Town and Country Planning Act 1990 | Flintshire County Council |
| Onshore England | • Hydrogen pipelines | • Planning Act 2008, Development Consent Order | Secretary of State for Energy Security and Net Zero |

## 3.2. ENVIRONMENTAL IMPACT ASSESSMENT

3.2.1. To gain development consent, the authorities listed above require that the applicant has met all legal requirements under relevant European Union Directives, and in particular Directive 2014/52/EU (amending Directives 2011/92/EU and 85/337/EEC) on the assessment of the impacts of certain private and public projects on the environment (the Environmental Impact Assessment (EIA) Directive).

3.2.2. The EIA Directive requires that certain types of projects, listed in Annex I and II of the Directive, with the potential to significantly affect the environment, have an EIA before a licence decision is made.

3.2.3. Except for the Protos spur pipeline, the various components of the HyNet Project fall within the categories of development listed in Annex I and II of the EIA Directive and are therefore captured by the following national transposing EIA legislation:

- Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended in 2017) in respect of the offshore elements of HyNet in Welsh Waters.
- Offshore Oil and Gas Exploration, Production, Unloading and Storage (Environmental Impact Assessment) Regulations 2020 in respect of the offshore elements in English Waters.
- Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 in respect of the onshore components of HyNet onshore in Wales.
- The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.
- The Town and Country Planning (Environmental Impact Assessment) Regulations 2017.

3.2.4. Separate Environmental Statements, and Environmental Reports have either been prepared, or are being prepared, to support applications for development consent.

## 3.3. HABITATS REGULATIONS ASSESSMENT

### LEGISLATIVE CONTEXT

3.3.1. The Habitats Directive (92/43/EEC) on the conservation of natural habitats and of wild fauna and flora, protects habitats and species of European nature conservation importance. Together with Council Directive (2009/147/EC) on the conservation of wild birds (the 'Birds Directive'), the Habitats Directive provide the EU's legal framework for the protection of wild fauna and flora and birds and establishes a network of internationally important sites, known as Natura 2000 sites or European sites, designated for their ecological status. This network of designated sites includes:

- SACs which are designated under the Habitats Directive and promote the protection of flora, fauna and habitats; and
- SPAs which are designated under the Birds Directive to protect rare, vulnerable and migratory birds.

3.3.2. These Directives are transposed into UK law by the Conservation of Habitats and Species Regulations 2017 (as amended) in inshore/territorial waters (onshore and out to 12 nm and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) in offshore waters (12 nm to Exclusive Economic Zone (EEZ) boundary). Collectively, these are known as the Habitats Regulations.

3.3.3. The UK is no longer an EU Member State, but the Habitats Directive as implemented by the Habitats Regulations, continues to provide the legislative framework for HRA in the UK. The HRA process implemented under the Habitats Regulations continues to apply (subject to minor changes effected by the 2019 Regulations) and the UK is bound by HRA judgments handed down by The Court of Justice of the European Union (CJEU) prior to 31 to December 2020.

3.3.4. The objective of the Habitats Regulations is to conserve, at a Favourable Conservation Status (FCS), those qualifying habitats and species and supporting habitats of qualifying species listed under the Habitats Directive and Birds Directive. Post EU Exit, the Habitats Regulations continue to refer to Annexes I and II of the Habitats Directive and Annex I of the Birds Directive and as such, reference is made to the annexes of the Habitats and Birds Directives in this report.

3.3.5. In addition to sites formally defined as European sites in the Habitats Regulations, UK Government policy (Office of Deputy Prime Minister (ODPM) Circular 06/2005) states that Wetlands of International Importance listed and proposed under the Ramsar Convention 1971 (Ramsar sites) are afforded the same protection. As a matter of policy, the UK Government also affords sites going through the formal designation process (i.e. pSPAs, cSACs and pSACs), SCIs and potential Ramsar sites, the same level of protection.

3.3.6. Under the Habitats Regulations, before granting approval (i.e. planning permissions, licenses and consents) for a development likely to have a significant effect on an SAC or SPA/Ramsar site, an Appropriate Assessment (AA) must be made by the competent authority, of the proposed plan or project's potential for AEoI of the site in view of that site's conservation objectives.

### EUROPEAN SITES (POST EU EXIT)

3.3.7. European sites (SACs and SPAs) in the UK no longer form part of the EU's Natura 2000 ecological network. The 2019 Regulations have created a National Site Network on land and at sea, including both the inshore and offshore marine areas in the UK. The National Site Network

comprises of European sites (SACs and SPAs) in the UK that already existed (i.e. were established under the Habitats or Birds Directives) on 31 December 2020 (or proposed to the European Commission (EC) before that date) and any new sites designated under the Habitats Regulations under an amended designation process.

3.3.8. Ramsar sites do not form part of the National Site Network. Many Ramsar sites overlap with SACs and SPAs and all Ramsar sites remain protected in the same way as SACs and SPAs.

**THE HRA PROCESS**

3.3.9. The AA procedure (referred to as the Habitats Regulations Assessment (HRA) process in the UK) is based on a four-stage approach, where the outcome at each successive stage determines whether a further stage in the process is required. The first stage is to undertake AA screening which establishes whether, in relation to a particular plan or project, AA is required.

3.3.10. If the AA Screening concludes 'Significant effects are certain, likely or uncertain' the plan or project must proceed to Stage two. Stage two is a more detailed ecological assessment of the proposed activities and considers, in greater detail, whether the plan or project could adversely affect the integrity of the European Site. There can be no reasonable scientific doubt on the conclusions drawn.

3.3.11. For the various component so the HyNet Project, the results of this stage have been presented by the applicant to the competent authority in either a Habitats Regulations Assessment (HRA), or a Report of Inform Appropriate Assessment (RIAA).

3.3.12. The Habitats Regulations make it clear that the person applying for the consent of the plan or project must provide such information as the competent authority may reasonably require for the purposes of the assessment. This Appropriate Assessment provides this information.

3.3.13. There are 32 European Sites within the zone of influence of the red line boundaries for the various development consents for the HyNet Project. The locations of these sites are illustrated in the series of figures presented in Annex A. Given these HyNet Project components are at different stages of development, these figures have been taken from either the EIA Scoping Reports or Habitats Regulations Assessment reports prepared to date for the respective component.

3.3.14. HyNet is not directly connected with or necessary to the management of the European Sites. It is therefore necessary for the project to be subject to the AA / HRA process.

3.3.15. Some European Sites are crossed by the HyNet Project, and others are either in the direct zone of influence of the project or contain mobile species that could potentially travel into the HyNet Project application areas. Table 3.2 presents a summary of the HRA processes carried out at

the time of preparing this summary report. The first column of the table lists all the European Sites that have been included in the assessments for the various project components.

3.3.16. The European Sites that have been identified are part of the baseline studies since they were assessed against the required buffers of the redline boundaries of the various projects. The assessments proved to have no adverse effects on integrity for the sites that overlap with the: Proposed Development, Point of Ayre, the River Dee crossing, and the Onshore Carbon Dioxide Transportation Pipeline, apart from the Dee Estuary SPA and Ramsar that has been assessed to have '*Without Mitigation Moderately adverse effect on integrity*' due to the Little Tern. This is because the offshore electrical cable installation, planned at the foreshore, could coincide with the nesting and breeding period.

3.3.17. The HyNet North West Hydrogen Pipeline Project and the Runcorn, and Padeswood Spur Pipeline Projects both need additional HRA screening to confirm their impact on the project integrity. However, these projects have very minor interfaces with European Sites, and it is likely that these projects would be able to implement the necessary mitigating measures and prevent any adverse effects.

3.3.18. All the other European Sites exhibit no interaction due to the distances between the schemes.

## Table 3.2 – Summary of HyNet Project interactions with European Sites

| European site | Offshore transportation and storage | PoA Terminal | Onshore $CO_2$ pipeline | River Dee crossing | Protos | Runcorn | Padeswood | Hydrogen pipeline |
|---|---|---|---|---|---|---|---|---|
| Liverpool Bay/Bae Lerpwl SPA. | ✓ No adverse effects on integrity | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Dee Estuary/Aber Dyfrdwy SAC. | ✓ No adverse effects on integrity | ✓ No adverse effects on integrity | ✓ No adverse effects on integrity | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interaction |
| Dee Estuary SPA and Ramsar | ✓ Without mitigation, moderate adverse effect on integrity for Little Tern | ✓ No adverse effects on integrity | ✓ No adverse effects on integrity | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interaction |
| River Dee and Bala Lake/Afon Dyfrdwy a Llyn Tegid SAC | ✓ No adverse effects on integrity | ✓ No adverse effects on integrity | ✓ No adverse effects on integrity | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interaction |
| Mersey Estuary SPA and Ramsar. | No interactions | No interactions | ✓ No adverse effects on integrity | No interactions | ✓ No adverse effects on integrity | Screened into future HRA | No interactions | Screened into future HRA |
| The Mersey Narrows and North Wirral Foreshore SPA and Ramsar | No interactions | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions |
| Ribble and Alt Estuaries SPA. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Anglesey Terns/Morwenoliaid Ynys Môn SPA. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Morecambe Bay and Duddon Estuary SPA. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Aberdaron Coast and Bardsey Island/Glannau Aberdaron ac Ynys Enlli SPA. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |

| European site | Offshore transportation and storage | PoA Terminal | Onshore $CO_2$ pipeline | River Dee crossing | Protos | Runcorn | Padeswood | Hydrogen pipeline |
|---|---|---|---|---|---|---|---|---|
| Ailsa Craig SPA. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Skomer, Skokholm and the Seas off Pembrokeshire/Sgomer, Sgogwm a Moroedd Penfro SPA. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Grassholm SPA. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Saltee Islands SPA and SAC. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Rockabill to Dalkey Island SAC. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Roaringwater Bay and Islands SAC. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Afon Gwyrfai a Llyn Cwellyn SAC. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Afon Eden - Cors Goch Trawsfynydd SAC. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| River Teifi/Afon Teifi SAC. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Cardigan Bay/Bae Ceredigion SAC. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| North Anglesey Marine/Gogledd Môn Forol SAC. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| North Channel SAC. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Lleyn Peninsula and the Sarnau SAC. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |

| European site | Offshore transportation and storage | PoA Terminal | Onshore $CO_2$ pipeline | River Dee crossing | Protos | Runcorn | Padeswood | Hydrogen pipeline |
|---|---|---|---|---|---|---|---|---|
| West Wales Marine SAC. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Strangford Lough SAC. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Murlough SAC. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| The Maidens SAC. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Pembrokeshire Marine/Sir Benfro Forol SAC. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Bristol Channel Approaches/Dynesfeydd Môr Hafren SAC. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Channel Approaches SAC). | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Lundy SAC. | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Halkyn Mountain SAC. | No interactions | ✓ No adverse effects on integrity | No interactions | No interactions | No interactions | No interactions | No interactions | No interaction |
| Deeside and Buckley Newt Sites SAC. | No interactions | No interactions | ✓ No adverse effects on integrity | ✓ No adverse effects on integrity | No interactions | No interactions | Screened into future HRA | No interaction |

3.3.19. HRAs and RIAAs have therefore either been prepared or are being prepared for all HyNet components. These have either been or will be submitted with the appropriate consent applications. Other plans, projects and licensable activities have been considered within 10km of the HyNet Project, considering the temporal extent of project activities, for a potential in-combination effect on European Sites and species. The in-combination screening assessment has considered common receptor pressures with other projects and identified no significant effects.

3.3.20. The HRAs and RIAAs conclude that with mitigation the HyNet Project will not have an adverse effect on the integrity of any European Site either alone or in combination with other plans or projects.

3.3.21. Following the implementation of project specific mitigation there will be no adverse effect on the integrity of any European Site either alone or in combination with other plans or projects.

## 3.4. METHOD FOR ASSESSMENT OF EFFECTS

3.4.1. The EIA process has considered the types of effects on the environment described in the following sections.

### DIRECT AND INDIRECT EFFECTS

3.4.2. The definitions used to describe direct and indirect effects are as follows:

- Direct effect - Effects that result from a direct interaction between the Project/Project activities and the receiving environment; and
- Indirect effect - Effects on the environment, which are not a direct result of the Project/Project activities, often produced away from the activity or because of a complex pathway. For example, loss of habitat from trenching, leading to reduction in prey species availability, having an indirect impact on predators.

3.4.3. The EIA process for each HyNet Project component has assessed direct and indirect effects of the project's activities on physical, biological, and socio-economic receptors. The significance of the effect has been determined and if effects are significant project specific mitigation has been proposed to eliminate or reduce the significance of the effect. The results of the EIA process are presented in separate ESs which cover individually the components of the HyNet Project. A summary of the post-mitigation effects is presented in the summary tables within Sections 4 to 11.

### INTER-PROJECT EFFECTS

3.4.4. Inter-project effects are an accumulation of effects from activities within different components of the HyNet Project e.g. effects caused by an activity within the Onshore Wales component combining with effects caused by an activity within the Offshore Wales component.

3.4.5. For a linear project such as HyNet, the scope of inter-project effects is limited to the interfaces between project components e.g. between Offshore Wales and Onshore Wales at the intertidal area. At the marine interfaces e.g. between Offshore Wales and Offshore England, the effects from the cable installation will move with the installation spread and therefore there is no spatial or temporal overlap; it is a continuation of the effects along the linear component. The significance of effects on receptors is therefore considered by the individual environmental assessments. No effects have been identified between the HyNet Project components that could accumulate to have a significant effect.

### CUMULATIVE EFFECTS

3.4.6. Cumulative effects are the addition of many minor or significant effects caused by the actions of other past, present, or reasonably foreseeable projects, plans, and licensable activities together with the HyNet Project.

3.4.7. Projects, plans, and licensable activities within 10km of the HyNet Project have been identified and assessed to determine whether there are potential cumulative effects.

3.4.8. The results of these assessments are presented in the individual ESs and summarised in Sections 4 to 11 of this document.

### TRANSBOUNDARY EFFECTS

3.4.9. Transboundary effects are effects that cross from one jurisdiction into another. The HyNet Project crosses two maritime jurisdictions (Wales and England). EIAs have been conducted for each jurisdiction, and as such transboundary assessment has been an integral component of the environmental assessment. The assessments have concluded that transboundary effects will be limited to sediment dispersion and underwater noise. These effects will be limited in spatial extent near the jurisdictional boundary and will be associated with one-off events that move along the cable centreline e.g. geophysical survey and cable installation. The EIA for Offshore Wales and Offshore England concluded that with mitigation the effects from the pressures associated with sediment dispersion and underwater noise changes are not significant, and therefore transboundary effects will also not be significant.

## 3.5. MITIGATION

3.5.1. The HyNet Project components have been developed through an iterative process that sought to avoid or reduce potential environmental effects. Steps taken to reduce environmental disturbance include:

- The identification of sensitive environmental features through Offshore and Onshore field surveys to collect baseline data about sensitive environmental features.
- Desk-based assessments that used publicly available datasets, and survey data acquired from other developers in the region.

- Offshore sections of the route in Wales were refined to avoid designated archaeological features.
- The offshore geophysical survey was widened in selected places to investigate the extent of potential reef habitat and sand wave features to see if they could be avoided.

3.5.2. In addition, to the route engineering that has taken place, the project will comply with international and national statute, which is designed to avoid or abate negative environmental effects.

3.5.3. Project specific mitigation is generally only proposed if the EIA process identifies significant effects on the environment. Project specific mitigation comprises measures to be adopted and implemented during construction and operation that are over and above legal compliance. Mitigation measures have been proposed as necessary in the ESs and are listed in a schedule of Enhancement, Mitigation and Monitoring Commitment, or a Register of Environmental Actions and Commitments (REAC).

3.5.4. The proposed mitigation measures will form the basis of either an Environmental Management Plan (EMP), or Construction Environmental Management Plan (CEMP) to be implemented in all project phases. The EMP/CEMP will be prepared by the appointed Installation Contractor and will form the basis of the approach to mitigating potential effects on the natural and human environment, and local community. Each EMP/CEMP will be submitted to the relevant competent authority for prior approval.

# 4. OFFSHORE TRANSPORTATION AND STORAGE

## 4.1. COMPONENTS

4.1.1. The Offshore Proposed Development is situated in the CS004 $CO_2$ Appraisal and Storage Licence area and Eni development area, around 12 km north of the Welsh coast and 2 km west of the English coast (Figure 4-1). The area covers about 576.82 km2 and includes depleted hydrocarbon reservoirs such as the Hamilton, Hamilton North, and Lennox fields. The Proposed Development is defined by the pipeline-cable corridor connecting Point of Ayr Terminal to Douglas Offshore Platform (OP), mainly in water depths ranging from 0.72 m below Lowest Astronomical Tide (LAT) to 35 m LAT, with average depth of about 20 m LAT.

4.1.2. The Eni development area contains existing offshore platforms (Douglas OP Complex, Lennox OP, Hamilton Main OP, and Hamilton North OP) to be repurposed for $CO_2$ service, with plans for decommissioning, subject to regulatory approval. Eni's infrastructure is part of a larger network of projects within Liverpool Bay that includes wind farms, electrical cables, future wind projects, and spoil dumping areas, and shipping lanes.

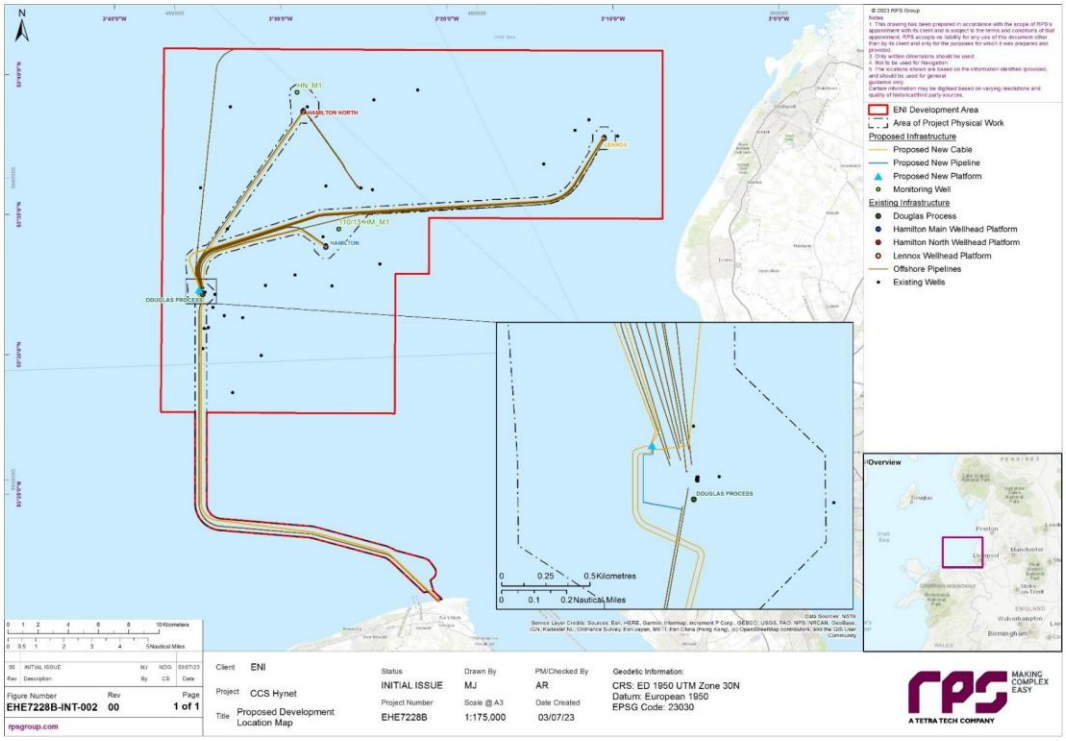


**Figure 4-1: Location of the Proposed Development and Development Area Overview**

4.1.3. As part of the offshore components of the project, the existing offshore natural gas import pipeline from Point of Ayr (PoA) Gas Terminal will be repurposed to become a $CO_2$ export pipeline and will transport the $CO_2$ to the newly constructed Douglas CCS platform. From the Douglas CCS

platform, $CO_2$ will be transported along the re-purposed natural gas pipelines to the Hamilton Main platform for injection into the Hamilton Main reservoir, to the Hamilton North platform for injection into the Hamilton North reservoir, and to the Lennox platform for injection into the Lennox reservoir. The offshore development project will also require new electrical and fibre optic transmission infrastructure seawards of Mean High Water Spring (MHWS), connecting the PoA Terminal to the offshore infrastructure (Figure 4-2). The Proposed Development requires permits and licenses from relevant authorities to undertake development within the marine environment and to store $CO_2$., these are:

- Marine Licence under the Marine and Coastal Access Act (MCAA) 2009 (administered by Natural Resources Wales Marine Licensing Team (NRW-MLT) for licensable activities in Welsh Waters (between 0 and 12 nautical miles (nm) from MHWS) (i.e. all licensable activities associated with installation of the new Douglas CCS platform, associated pipeline connections, new electrical and fibre optic cables, and related works within Territorial Waters); and
- a Storage Permit from the North Sea Transition Authority (NSTA), in accordance with the Storage of Carbon Dioxide (Licensing etc.) Regulations 2010 (SI 2010/2221) for the storage of $CO_2$ at a storage site in the licensed area (licence reference CS004). Prior to the issue of a Storage Licence the Offshore Petroleum Regulator for Environment & Decommissioning (OPRED) must approve the ES.


**Figure 4-2: Illustrates The Concept of The Proposed Development (Infrastructure Seawards MHWS)**

4.1.4. The Proposed Development, both new and repurposed existing offshore infrastructure will be situated within the Eni development area. The key components include:

- Utilisation of the existing Hamilton Main, Hamilton North, and Lennox reservoirs for the injection of 109 Mt of $CO_2$ over a 25-year period for permanent geological storage. The storage would be divided between the three reservoirs, as follows: Hamilton Main, 53 Mt; Hamilton North, 18 Mt; and Lennox 38 Mt.
- Drilling and re-completion of injection wells by side-tracking existing production wells. This includes drilling and recompletion operations, all of which will be within the existing footprint (template) of each platform.
- Installation of a new Douglas CCS platform to replace the existing Douglas Process platform to receive $CO_2$ from the onshore PoA Terminal and distribute $CO_2$ to the Hamilton Main, Hamilton North, and Lennox wellhead platforms and when necessary, provide heating to the $CO_2$ stream. Installation of the new Douglas CCS platform will include up to eight driven piles.
- Installation of new sections of pipeline, concrete mattresses, and external rock protection to connect the new Douglas CCS platform and the existing subsea natural gas pipelines.
- Installation of new topsides on the Hamilton Main, Hamilton North, and Lennox wellhead platforms to receive and inject $CO_2$ into the depleted hydrocarbon reservoirs.
- Repurposing of the existing subsea natural gas pipelines for their change of use from hydrocarbon to $CO_2$ service.
- Implementation of a Monitoring Plan. This includes the drilling of two new monitoring wells, one at Hamilton North and one at Hamilton Main. Additional monitoring wells will be created from the recompletion of existing wells within the existing footprint (template) of each platform: one monitoring well created by side-tracking an existing well in Lennox; and two sentinel wells, one in Hamilton North and one in Lennox.
- Installation of one submarine 33 kilovolt (kV) power cable, with integrated fibre-optic cable connections (34 km from PoA Terminal onshore to the modified Douglas platform, including within the intertidal/foreshore area up to MHWS, within Welsh waters only).
- Installation of new submarine 33 kV power cable with integrated fibre-optic connecting the modified Douglas platform with the Hamilton Main (12 km; 33 kV), Hamilton North (15 km; 33 kV) and Lennox (35 km; 33 kV) platforms.
- Installation of concrete mattresses and external cable protection, at crossings of existing cables, and in areas where cable burial is not deemed feasible, or as a remedial secondary protection measure if the target cable depth of lowering cannot be achieved.

4.1.5. The above infrastructure will be contained within the Eni Development Area. The new Douglas CCS Platform, with its topsides and jacket structure, will play a central role in $CO_2$ distribution and injection, and the entire Proposed Development aims to repurpose existing facilities for environmentally responsible $CO_2$ management.

4.1.6. Prior to the commencement of the Proposed Development there will be a partial decommissioning programme (PDP) that will make ready the Liverpool Bay assets that will be repurposed for $CO_2$ transportation and storage. The partial decommissioning will comprise the following:

- Removal of the satellite platform topsides at Lennox, Hamilton, and Hamilton Main;
- Plugging and abandonment (P&A) of wells at Douglas, Hamilton, Hamilton North, and Lennox; and
- Removal of expansion spools, umbilicals, and exposed stabilisation features (mattresses and grout bags) in the near platform area (at Douglas, Hamilton, Hamilton North, and Lennox), which do not meet the 0.6m depth of burial criterion and therefore cannot be left in-situ.

4.1.7. Construction of the Proposed Development is anticipated to start in late 2024, to enable operation to commence during 2026/2027.

## 4.2. OFFSHORE PLATFORMS

4.2.1. Existing platforms, like Hamilton Main, Hamilton North, and Lennox Oil and Gas Platforms, will be modified for $CO_2$ service. A new platform, Douglas CCS, will be designed for direct offshore installation. Jackets for the platforms will be transported by barge and installed using heavy lifting vessels (HLVs) or Floating Shear Legs (FSLs).

- New Douglass CCS platform will be installed to the northwest to the exiting Douglas complex, just beyond the blow-out/H2S dispersion radius of the existing facilities at approximate coordinates E461607 N5932596. The new Douglas CCS platform will be a Normally Unmanned Installation (NUI), acting as a hub for the CCS operations.
- The new Douglas CCS platform will receive and distribute $CO_2$ to the Hamilton Main, Hamilton North, and Lennox OPs. When necessary, the Douglas platform will additionally provide pressure control and heating prior to distribution of the $CO_2$ to the three fields. The existing Hamilton Main, Hamilton North, and Lennox OPs will be redeveloped in an incremental manner for $CO_2$ service, as dictated by the availability of $CO_2$ from the emitters.

## 4.3. REPURPOSING EXISTING INTER-FIELD PIPELINES

4.3.1. Current pipelines will be repurposed for $CO_2$ transport, and short rerouting and seabed connections will be made to the new Douglas CCS platform. Sand wave ridges will require seabed preparation using excavation methods.

4.3.2. A Pipeline Works Authorisation is the consenting required for the repurposing and the installation of the new inter-filed pipelines. Chemical Permits will be required if chemicals are used and discharged during pipeline commissioning.

## 4.4. OFFSHORE POWER AND FIBRE OPTIC CABLE

4.4.1. The offshore power cable is a 3-core 33 kV, 50 Hz subsea armoured electrical cable with bundled fibre-optic cable. The single armoured submarine cable comprises a copper conductor, XLPE (Cross Linked Polyethylene), copper wires, and copper foil bonded to the polyethylene sheath. External protection will be required on each of the electrical cables on their final approaches to the new Douglas platform and at the crossings of existing pipelines and cables.

4.4.2. The Offshore power and FO cable will, as a general principle, follow the alignment of the existing pipelines at an offset of around 100 m, and there may be a need to micro-route the cables around identified obstructions such as heritage assets, and unexploded ordnance (UXO).

4.4.3. The cable route involves passing under the Talacre dune system via Horizontal Directional Drilling (HDD) and different techniques, including ploughing, jetting, and trenching, will be used to bury the cables.

4.4.4. The preferred route option of the offshore power cable is through the east of West Hoyle Spit. This alternative will be taken forward to detailed design by the EPC contractor. The excavation of the trench across the spit previously proposed will therefore be avoided.

4.4.5. The offshore power cable measuring 35 km in length will be erected, extending from Point of Ayr to Douglas OP.

4.4.6. Three cables from the new Douglas OP to each of the satellite platforms 35 km, 15 km, and 12 km respectively to Hamilton Lennox, Hamilton North and Hamilton Main.

4.4.7. Each of the cables will have to cross several existing pipelines and cables. The numbers of crossings and overall lengths for each cable are summarised in Table 4-1, and Table 4-2.

Table 4-1 - Cables

| Parameter | Number of crossings | Cable Length |
|---|---|---|
| Cables from PoA Terminal to Douglas OP | 10 | 35,000 m |
| Inter-platform cable from Douglas OP to Hamilton North OP | 8 | 15,000 m |
| Inter-platform cable from Douglas OP to Hamilton Main OP | 8 | 12,000 m |
| Inter-platform cable from Douglas OP to Lennox OP | 6 | 35,000 m |

Table 4-2 - Third part cable crossing

| Crossing ID | Third-party owner | UTM Easting (m) | UTM Northing (m) | Water depth (m) | Water above berm (m) | Berm height (m |
|---|---|---|---|---|---|---|
| PoAX-1 | Ørsted Burbo Bank wind farm | 470974.84 | 5916002.39 | 5 | 4.2 | 0.8 |
| PoAX-2 | Greencoat UK Wind North Hoyle wind farm | 468795.03 | 5916535.10 | 7 | 6.2 | 0.8 |
| *PoAX-3* | | *468776.17* | *5916536.68* | *7* | *6.2* | *0.8* |
| PoAX-4 | Gwynt y Môr OFTO, Gwynt y Môr wind farm | 461904.20 | 5917763.30 | 12 | 11.2 | 0.8 |
| *PoAX-5* | | *461875.07* | *5917817.57* | *12* | *11.2* | *0.8* |
| PoAX-6 | | 461713.35 | 5924702.50 | 20 | 19.2 | 0.8 |
| PoAX-7 | National Grid/Scottish Power, Western Link HVDC cable | 461713.35 | 5930787.10 | 30 | 29.2 | 0.8 |
| PoAX-8 | | 461713.35 | 5930818.38 | 30 | 29.2 | 0.8 |

## DRILLING ACTIVITIES

4.4.8. The development of the Hamilton Main, Hamilton North, and Lennox hydrocarbon depleted reservoirs for $CO_2$ storage requires the drilling and re-completion of wells for $CO_2$ injection, by side-tracking existing production wells.

4.4.9. In addition to the $CO_2$ injector wells, monitoring, and sentinel wells are planned for $CO_2$ conformance and containment monitoring, and to inform the Monitoring Plan, during the pre-injection, operation, and post closure phases.

4.4.10. Their locations have been selected to accommodate the Monitoring Plan needs and target sensitive areas that require tailored monitoring.

4.4.11. The current base case for the Proposed Development includes a total of 13 wells (Table 4-3), of which:

- Eight will be $CO_2$ injector wells (four at Hamilton Main, two at Hamilton North, and two at Lennox). These will be drilled as side-tracks from existing producer wells, within the existing footprint (template) of each platform, to install $CO_2$ resistant tubulars and cement.
- Two will be new monitoring wells (one at Hamilton Main, and one at Hamilton North). These will target areas on the flanks of the reservoirs not previously drilled hence why new wells will be needed.
- One will be an additional monitoring well, side-track from an existing producer well within the existing footprint (template) of the platform. This will be drilled at the Lennox field; and
- Two will be sentinel wells (one at Hamilton North, and one at Lennox). These wells will be existing wells within the existing footprint

(template) of each platform that will be recompleted for additional reservoir monitoring. They will not have $CO_2$ resistant cement or tubulars. As such, they will be Plugged and Abandoned (P&A) once the $CO_2$ front in the reservoir reaches them.

- All $CO_2$ injection and monitoring wells will be drilled from the existing platform well slots (either as side-track or as new ones), while the sentinel wells will be only recompleted and therefore not require any drilling activity.

Table 4-3 - Overview of wells

| Well type | Field | Well name | Easting | Northing | Kick-off point m | Measured Depth m | True Vertical Depth m |
|---|---|---|---|---|---|---|---|
| Injector wells | | | | | | | |
| Sidetrack | Hamilton | H1ST1 | 469685 | 5936706.2 | 863 | 1498 | 932 |
| | | H2ST1 | 470200.5 | 5937333.5 | 1686 | 2380 | 932 |
| | | H3ST1 | 470200.5 | 5935501.56 | 893 | 1366 | 932 |
| | | H4ST1 | 470200.5 | 5934462.3 | 1579 | 2219 | 933 |
| | Hamilton North | N1ST | 468323 | 5945412.5 | 783 | 1403 | 971 |
| | | N3ST | 468323 | 5944406.4 | 713 | 1043 | 1010 |
| | Lennox | L13ST2 | 489487.6 | 5942334.3 | 678 | 1668 | 865 |
| | | L5ST1 | 489487.6 | 5942938.2 | 625 | 1947 | 1124 |
| Monitoring wells | | | | | | | |
| New well | Hamilton | HM_M2_1 | 470848.6 | 5936608.7 | N/A | 1894 | 960 |
| | Hamilton North | HN_M2_1 | 468084.6 | 5945670.8 | N/A | 1781 | 1043 |
| Sidetrack | Lennox | LX_M3_2 | 490155.3 | 5941955.3 | 625 | 2466 | 1114 |
| Sentinel wells | | | | | | | |
| Recompletion | Hamilton North | HN_M3 | 469272 | 5944899 | N/A | N/A | N/A |
| | Lennox | LX-M2_1 | 487637 | 5941932 | N/A | N/A | N/A |

## 4.5. SUMMARY OF ENVIRONMENTAL EFFECTS AND PROJECT SPECIFIC MITIGATION

4.5.1. Table 4-4 summarises the findings of the EIA process and the ES conclusions.

## Table 4-4 – Summary of offshore transportation and storage project – Construction Phase

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| Physical processes<br><br>• Increased SSCs and sediment deposition<br><br>• Changes to seabed morphology; and<br><br>• Activities affecting surrounding water quality | The impacts are generally localised, short-term, and of low magnitude, affecting areas like the Dee Estuary SAC/SPA/SSSI and West Hoyle Spit. Despite temporary increases in suspended sediment levels and sedimentation, the sensitivity of these areas to changes remains low due to their recoverable nature.<br><br>There would be a short-term change in seabed morphology due to altered bed levels. The changes will fall within the natural range of variability due to the highly mobile nature of the sand waves and would not interfere with their eastern migration. Additionally, any excavated material is expected to remain within the sediment cell and settle in the direct vicinity Consequently, the overall impact is deemed of minor adverse significance for the construction, operational and maintenance, and decommissioning phase, which is not significant in EIA terms. No additional mitigation beyond existing designed measures was considered necessary for these effects.<br><br>During the construction phase of the project, activities such as trenching for cable routes could lead to increased SSC near the coastline, potentially affecting local tidal patterns and wave climate. These heightened SSC levels might release contaminants from disturbed harming marine life. sediments, impacting water quality | Development and adherence to a Cable Specification and Installation Plan which will include cable burial where possible and cable protection. To minimise potential impact from the cables and removal of cables a commitment to bury cables where possible has been made in accordance with the specific policies set out in the Northwest Inshore and North West Offshore Coast Marine Plans (MMO, 2021).<br><br>Development and adherence to a Cable Specification and Installation Plan which will include cable burial where possible and cable protection. To minimise potential impact from the cables and removal of cables a commitment to bury cables where possible has been made in accordance with the specific policies set out in the Northwest Inshore and North West Offshore Coast Marine Plans (MMO, 2021).<br><br>Scour protection limited to use as third-party cable crossings and monitored in line with Cable Specification and Installation Plan.<br><br>No external cable protection in the intertidal area to minimise potential impacts on intertidal | Following implementation of the mitigation measures identified, the overall impact is deemed of minor adverse significance for the construction, operational and maintenance, and decommissioning phase, which is not significant in EIA terms. No additional mitigation beyond existing designed measures was considered necessary for these effects. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| | and potentially. However, sediment contamination assessments suggest that significant releases of sediment-bound contaminants are unlikely due to construction activities. These impacts are projected to be of low to negligible magnitude, with sensitivity generally considered high. The significance of effects was evaluated to be minor or moderate, which is not significant in EIA terms.<br><br>Cumulative effects are assessed in full in the ES. The magnitude of these cumulative effects is deemed to be low for all phases and effects to be of local spatial extent effecting receptors of low sensitivity for designated sites and West Hoyle Bank, and high for water quality. The significance of effects was therefore evaluated to be minor, which is not significant in EIA terms.<br>No significant transboundary effects regarding physical processes from the Proposed Development were predicted on the interests of other states. | habitats within the Dee Estuary SAC and SPA.<br><br>Cable protection to have a profiled cross section and height mitigated to < 1 m to minimise changes to seabed morphology and physical processes such as tidal current, wave regime and sediment transport pathways, particularly if located in shallow water.<br><br>Material arising from drilling and/or sand waves and wave clearance will be deposited near the works to retain material within sediment cell, reduce changes to seabed morphology and main Development of and adherence to an Environmental Management Plan (EMP) that will be prepared and implemented during the construction, operational and maintenance and decommissioning phases of the proposed development. The EMP will include appendices detailing actions to minimise INNS (the INNSMP), and a MPCP will be developed which will include planning for accidental spills, address all potential contaminant releases and include key emergency contact details in sediment transport regimes. | |
| Marine Biodiversity | Temporary and long-term habitat loss/disturbance was deemed to be of | Development of, and adherence to, a Cable Specification and | With the measures adopted as part of the Proposed |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| 1-Benthic subtidal and intertidal ecology<br>• temporary subtidal habitat loss and/or disturbance.<br>• increased SSCs and associated deposition.<br>• long-term subtidal habitat loss.<br>• introduction of artificial habitat and colonisation of hard structures.<br>• increased temperature impacting benthic communities.<br>• impacts resulting from the release of sediment bound contaminants.<br>• accidental pollution to the surrounding area; and,<br>• increased risk of introduction and spread of Invasive Non-Native Species (INNS). | negligible (Ross worm IEF) to minor adverse significance (all other IEFs; not significant in EIA terms). This conclusion was reached, based on the small proportion of habitat loss predicted in the context of available habitats in the Proposed Development and, as most of the disturbed habitat is sedimentary, the habitat is likely to recover following disturbance/loss. Additionally, no significant effects were predicted on protected potential reef habitats, on the assumption that measures to avoid direct impacts to these features will be implemented.<br><br>Increases in suspended sediment concentrations and associated deposition were deemed to be of minor adverse significance (not significant in EIA terms) for all IEFs. This conclusion was reached due to the short-term nature of the impact with sediments quickly dispersing and most of the IEFs being of low sensitivity to this type of impact. Again, no significant effects were predicted on protected potential reef habitats, on the assumption that measures to avoid direct impacts to these features will be implemented.<br><br>Long-term habitat loss was deemed to be of negligible to minor adverse significance (not significant in EIA terms) for all IEFs (no long-term habitat loss in the intertidal is predicted). This conclusion was reached due to the small area affected in relation to the | Installation Plan (CSIP) which will include cable burial where possible (in accordance with the specific policies set out in the North West Inshore and North West Offshore Marine Plan (MMO, 2021)) and cable protection, as necessary<br><br>Implementation of piling initiation, soft-start, and ramp-up measures within the Marine Mammal Mitigation Protocol. An initiation stage and soft starts will be used during the installation of pin piles. This involves the implementation of an initial low hammer energy with a low number of strikes, followed by lower hammer energies at a higher strike rate at the beginning of the piling sequence before energy input is 'ramped up' (increased) over time to required higher levels.<br><br>Inclusion of low order techniques as a UXO clearance option noting, however, that it is not possible to fully commit to this measure at this stage.<br><br>Low order techniques are not always possible and are dependent upon the individual situations surrounding each UXO. Given that high order detonation may be required, the MMMP will also include | Development (e.g. cable burial where possible) in place, all of these impacts result in effects of either negligible or minor adverse significance, which is not significant in EIA terms. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| | benthic subtidal and intertidal ecology study area. Again, no significant effects were predicted on protected potential reef habitats, on the assumption that measures to avoid direct impacts to these features will be implemented.<br><br>Introduction of artificial habitat and colonisation of hard structures was deemed to be of minor adverse significance (not significant in EIA terms) for all IEFs.<br>A minor adverse significance has been concluded as this impact will only affect a small proportion of the Eni Development Area (0.01%) in which these IEFs occupy.<br><br>Introduction of artificial habitat and colonisation of hard structures was deemed to be of minor adverse significance (not significant in EIA terms) for all IEFs.<br>A minor adverse significance has been concluded as this impact will only affect a small proportion of the Eni Development Area (0.01%) in which these IEFs occupy.<br><br>Increased temperature impacting benthic communities was deemed to be of negligible adverse significance (not significant in EIA terms) for all IEFs.<br>Although temperature increases are unlikely to occur in the first place, it is likely that only deep burrowing species or sessile benthic species within centimetres from the pipelines could be impacted. Due to the natural fluctuations in temperature | mitigation to reduce the risk of injury from UXO clearance.<br><br>Development of and adherence to an EMP that will be prepared and implemented during the construction, operational and maintenance and decommissioning phases of the Proposed Development. The EMP will include appendices detailing actions to minimise INNS (the INNS Management Plan (INNSMP)), and a MPCP will be developed which will include planning for accidental spills, address all potential contaminant releases and include key emergency contact details.<br><br>Development of and adherence to a MMMP, based on a draft MMMP submitted alongside the ES. The MMMP will present appropriate mitigation for activities that could potentially lead to injurious effects on marine mammals including piling, UXO clearance and some types of geophysical activities. The MMMP will be developed based on the most recent published statutory guidance and in consultation with key stakeholders | |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| | throughout the year, it is also likely that benthic subtidal and intertidal receptors will be tolerant to small temperature increases associated with this impact.<br><br>Impacts resulting from the release of sediment bound contaminants was deemed to be of minor adverse significance (not significant in EIA terms) for subtidal habitats and species IEFs and the Fylde MCZ IEF. No MarESA available for the relevant pressures for this impact for any IEFs. The potential intolerance of many benthic species to contamination (bivalves and echinoderms in particular), the sensitivity of these receptors has been assessed on a precautionary basis.<br><br>Accidental pollution to the surrounding area was deemed to be of minor adverse significance (not significant in EIA terms) for all IEFs. The assessment has been undertaken on the same reasoning as the above impact and on a precautionary basis. Increased risk of introduction and spread of INNS was deemed to be of minor adverse significance (not significant in EIA terms) for subtidal habitats and species IEFs and the Fylde MCZ IEF. This is due to the small proportion of the Eni Development Area that may be colonised by INNS and due to the precautionary high sensitivity of the receptor. However, embedded mitigation listed on the right of this table , such as the INNS | | |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| | Management Plan, will ensure that the risk of introduction is controlled as far as reasonably practicable.<br><br>Cumulative effects from, cables and pipelines, remedial works and other offshore renewable developments were assessed for their impact in relation to temporary habitat loss and/or disturbance; increased SSC and associated deposition; long-term habitat loss; introduction of artificial habitat and colonisation of hard structures; and increased risk of introduction or spread of INNS. The cumulative effects assessment predicted that there were no plans, projects, or activities identified within the CEA for the construction, operation and maintenance, and decommissioning phases.<br><br>No transboundary effects with regard to benthic subtidal and intertidal ecology from the Proposed Development were predicted on the interests of other states. | | |
| 2-Fish and shellfish ecology:<br><br>• temporary subtidal habitat loss and/or disturbance.<br><br>• long-term subtidal habitat loss.<br>• underwater noise impacting fish and shellfish receptors; and<br><br>• increased SSCs and associated deposition. | Temporary and long-term subtidal habitat loss and/or disturbance were both deemed to be of negligible (diadromous IEF) to minor adverse significance (all other IEFs; not significant in EIA terms) to fish and shellfish receptors, as the proportion of habitat lost within the Proposed Development was predicted to be small in the context of other similar available habitats in the wider fish and shellfish ecology study area | | With the measures adopted as part of the Proposed Development (e.g. implementation of piling soft-start and ramp-up measures), all these impacts in all project phases result in effects of either negligible or minor adverse significance, which are not significant in EIA terms. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| | The impact of underwater sound was deemed to be of minor adverse significance (all other IEFs; not significant in EIA terms) to both moving and static fish, and shellfish receptors, due to the limited piling activities (800 minutes) to be undertaken on an intermittent basis.<br><br>Increased SSCs and associated deposition was assessed as negligible adverse (all IEFs) and minor adverse (Herring IEF; not significant in EIA terms) to fish and shellfish receptors, due to the low sensitivity to smothering events, except for herring whereby the sensitivity to smoothing is increase at spawning sites.<br><br>Cumulative effects from cables and pipelines, remedial works and other offshore renewable developments were assessed for their impact in relation to: Temporary subtidal habitat loss and/or disturbance, long-term subtidal habitat loss, underwater noise impacting fish and shellfish receptors, and increased SSCs and associated deposition. The cumulative effects assessment predicted that there were no plans, projects, or activities identified within the CEA for the construction, operation and maintenance, and decommissioning phases.<br><br>No transboundary effects on the interests of other states are predicted for fish and shellfish ecology from the Proposed Development. | | |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| 3-Marine Mammals and Marine Turtles:<br>• injury, Disturbance, and Displacement from Underwater Noise Generated during Piling.<br>• injury, Disturbance, and Displacement from Underwater Noise Generated during UXO Clearance;<br>• injury, Disturbance, and Displacement from Underwater Noise Generated during Geophysical and Seismic Site Investigation Surveys.<br>• injury, Disturbance, and Displacement from Vessel Activity and other Noise Producing Activities.<br>• injury due to Collision with Marine Vessels; and<br>• effects on Marine Mammals and Marine Turtles due to changes in Prey Availability. | Injury and disturbance from elevated underwater sound during the five listed impacts listed on the receptors was deemed to be of negligible to minor adverse significance (not significant in EIA terms) to marine mammals; whilst underwater sound modelling predicted ranges of impact which had the potential to result in injury and disturbance to a small number of animals. For the assessment of injury, with measures adopted as part of the Proposed Development in place in the form of a draft Marine Mammal Mitigation Protocol (MMMP), the impact would result in a very small risk of injury, as animals will be deterred beyond the predicted injury range. For the assessment of disturbance, it was considered that whilst a small number of animals could experience mild disturbance, this was unlikely to lead to population level effects. In addition, population modelling was carried out to explore the potential of disturbance during piling to affect the population trajectory over time for harbour porpoise, bottlenose dolphin, minke whale and grey seal, which confirmed the assessment that this impact was unlikely to lead to population level effects.<br><br>Injury due to collision with marine vessels was deemed to be of minor adverse significance (not significant in EIA terms). An increase in vessel movements could lead to an increase | | With the measures adopted as part of the Proposed Development (e.g. implementation of piling soft-start and ramp-up measures), all these impacts in all project phases result in effects of either negligible or minor adverse significance, which are not significant in EIA terms. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| | in interactions between marine mammals and vessels, resulting in fatal and non-fatal injuries. Vessels travelling at 7m/s or faster are those most likely to cause death or serious injury to marine mammals. Largely, vessels involved in the construction phase are likely to be travelling considerably slower than this, and all vessels will be required to follow the provisions set out in the offshore EMP. With adherence to this EMP, in combination with the likelihood that animals will be deterred by the noise of moving vessels, the risk of collision is reduced .<br>Effects on marine mammals and marine turtles due to changes in prey availability was assessed as minor adverse significance (not significant in EIA terms). This was due to the ability of the receptor to be tolerant to changes in prey availability.<br><br>Cumulative effects were assessed for the following: injury, disturbance, and displacement from underwater noise generated during piling; injury, disturbance, and displacement from underwater noise generated during UXO clearance; injury, disturbance, and displacement from underwater noise generated during geophysical and seismic site investigation surveys; injury, disturbance, and displacement from vessel activity and other noise producing activities; and injury due to collision with marine vessels. Overall, in the CEA there were no significant cumulative effects identified for any | | |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| | plans, projects, or activities on marine mammals and marine turtles.<br><br>No transboundary effects with regard to marine mammals from the Proposed Development were predicted on the interests of other states. | | |
| Marine Ornithology<br><br>• temporary habitat loss leading to displacement/disturbance of birds.<br><br>• disturbance and displacement from airborne sound and presence of vessels and infrastructure.<br><br>• collision with static offshore infrastructure.<br><br>• indirect impacts to birds from changes in prey availability.<br><br>• accidental pollution in the surrounding area; and<br><br>• creation of roosting and nesting habitats among project infrastructure. | Temporary habitat loss leading to displacement/disturbance of birds was deemed to be negligible to minor adverse significance (not significant in EIA terms) to the seabird species within the Proposed Development. This is due to the limited impact on habitat, and displacement found to be below to 1% mortality threshold.<br><br>Disturbance and displacement from airborne noise and presence of vessels and infrastructure was deemed to be of negligible to minor adverse significance (not significant in EIA terms) to the seabird species within the Proposed Development. This is due to the short-term nature of the impact during the construction, operation and maintenance, and decommissioning phases.<br><br>Collision with static offshore infrastructure was deemed to be of no change (not significant in EIA terms) to the seabird species within the Proposed Development. This is due to limited infrastructure present and species ability to avoid non-moving structures. | The Applicant is aware of two periods during the year when birds associated with the Dee Estuary SPA and Ramsar site are potentially at their most sensitive to disturbance from cable installation works. The two periods are as follows:<br>• The two hours either site of a high tide during the overwintering period (September to March inclusive); and<br>• The little tern breeding season, which runs from mid-April to mid-July.<br><br>The Applicant is cognisant of the need to accommodate the seasonal/timing constraints as part of the construction schedule, including balancing conflicting constraints, to avoid/minimise any adverse effects arising from construction. Where avoidance of a recommended seasonal window is not achievable, appropriate alternative mitigation and | It is concluded that there will be moderate adverse significant effects arising from the Proposed Development during the construction and decommissioning phases due to indirect impacts upon prey availability.<br>The Applicant will continue to engage with NRW and FCC on the protection of sensitive species during the construction period. Pre-commencement ecological surveys will be used as a basis for planning of specific activities. Activities will be timed to reduce impacts on ecological receptors where practicable.<br>A detailed Method Statement will be produced by the contractor for prior approval prior commencement of work in collaboration with NRW-MLT to outline how impacts on birds will be avoided during the works. This is likely to include planning of the time and duration of activities, toolbox talks for site contractors, and appropriate selection of plant |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| | Indirect impacts to most birds from changes in prey availability was deemed to be of negligible to moderate adverse significance (not significant in EIA terms) to the seabird species within the Proposed Development. This is due to the changes in prey availability found to be below to 1% mortality threshold. The exception is for breeding terns, which would experience a significant effect should the cable installation works be carried out during the breeding period. Avoidance of the breeding period for cable installation will prevent adverse effects on little tern from occurring.<br><br>Accidental pollution in the surrounding area was deemed to be of negligible adverse significance (not significant in EIA terms) to the seabird species within the Proposed Development. This is due to regulations in place that manage vessels and their hazardous products onboard, such as fuels.<br><br>Creation of roosting and nesting habitats among project infrastructure was deemed to be of minor beneficial significance (not significant in EIA terms) to the seabird species within the Proposed Development. This is due to the creation of suitable roosting habitat within the Proposed Development<br><br>Cumulative effects were assessed for temporary habitat loss leading to displacement/disturbance of birds, | licensing (where required) will be realised to ensure protection of species and facilitate construction.<br><br>Work will be carried out to define the sensitive egg laying and chick rearing period for the Gronant Dunes little tern colony, during which time impacts upon prey availability may lead to a reduction in productivity. This will be used to inform any seasonal limitations that need to be placed upon certain work activities. | machinery to minimise disturbance.<br><br>For all other species it is concluded that there will be no significant impacts from the Proposed Development during the construction, operation, and decommissioning phases. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| | disturbance and displacement from airborne sound and presence of vessels and infrastructure and indirect impacts to birds from changes in prey availability. Overall, there were no significant cumulative effects identified for any plans, projects, or activities in the CEA for ornithology.<br><br>No transboundary effects with regard to offshore ornithology from the Proposed Development were predicted on the interests of other states. | | |
| Commercial fisheries<br><br>• Loss or restricted access to fishing grounds<br><br>• Impacts on commercially valuable fish and shellfish species/resources;<br><br>• Interference with fishing activity;<br><br>• Temporary increases in steaming distances to fishing grounds;<br><br>• Supply chain opportunities for local fishing vessels; and<br><br>• Loss or damage to fishing gear due to snagging gear on project infrastructure. | Loss or restricted access to fishing grounds was deemed to be of moderate adverse significance to the UK potting fishery (significant in EIA terms), and minor adverse significance (for all other receptors; not significant in EIA terms) to the shipping and navigation receptors within the Proposed Development. Additional mitigation is proposed to reduce the residual impact to minor adverse significance through the justifiable disturbance payment procedure as outlined in the FLOWW guidance documents (2014 and 2015).<br><br>Impacts on commercially valuable fish and shellfish species/resources was deemed to be of minor adverse significance (not significant in EIA terms) to the shipping and navigation receptors within the Proposed Development. Temporary noise and seabed disturbances during activities | The Applicant is committed to ongoing liaison with fishermen throughout all stages of the Proposed Development, including the following:<br>• Appointment of a company FLO and/or Fishing Industry Representatives (FIRs) to maintain effective communications between the Applicant and fishermen.<br>• Appropriate liaison with relevant fishing interests to ensure that they are fully informed of development planning and any offshore activities and works.<br>• Timely issue of notifications including Notice to Mariners (NtMs), Kingfisher Bulletin notifications and | With the measures adopted as part of the Proposed Development (e.g. appointment of a FLO) in place, and in some cases with the implementation of further mitigation, most of these impacts result in effects of negligible or minor adverse significance which is not significant in EIA terms. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | may displace commercially important fish and shellfish populations from the area, however, due to localised spatial extent this impact on important fisheries, this impact is lessened.<br><br>Interference with fishing activity was deemed to be of minor adverse significance (not significant in EIA terms) to the shipping and navigation receptors within the Proposed Development. All fishing fleets are considered able to avoid vessel movements related to the Proposed Development activities.<br>Temporary increases in steaming distances to fishing grounds was deemed to be of negligible to minor adverse significance (not significant in EIA terms) to the shipping and navigation receptors within the Proposed Development. In relation to ground within the area of project physical work, all commercial fisheries fleets are considered to have medium to high availability of alternative fishing grounds and an operational range that is not limited to this Eni Development area.<br><br>Supply chain opportunities for local fishing vessels was deemed to be of minor beneficial significance (not significant in EIA terms) to the shipping and navigation receptors within the Proposed Development. The opportunity exists for local fishing vessel owners to apply for specific roles or positions within the Proposed Development. | other navigational warnings to the fishing community to provide advance warning of Proposed Development activities and associated Safety Zones and advisory safety distance<br>• Development, prior to construction, of a Fisheries Liaison and Coexistence Plan (FLCP), setting out in detail the planned approach to fisheries liaison and means of delivering any other relevant mitigation measures.<br><br>Marking and Lighting<br><br>The Applicant is committed to marking and lighting the Proposed Development in accordance with relevant industry guidance and as advised by relevant stakeholders including the Maritime and Coastguard Agency (MCA), Civil Aviation Authority (CAA) and Trinity House.<br><br>The Applicant will also ensure the Proposed Development is adequately marked on nautical charts. It is expected that a lighting and marking plan will be secured within a Marine Licence condition. | |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | Loss or damage to fishing gear due to snagging gear on project infrastructure was deemed to be of minor adverse significance (not significant in EIA terms) to the shipping and navigation receptors within the Proposed Development. It is considered likely that fishermen will operate appropriately (i.e. avoiding the indicated infrastructure and cable protection at the defined location) given adequate notification of the locations of any snagging hazards; and are highly likely to avoid the infrastructure and cable protection within safety zones. Embedded mitigation details that the target minimum burial depth of cables is to 2 m, where possible and detailed Cable Burial Risk Assessment, the results of which will be communicated to fisheries stakeholders.<br><br>Cumulative effects were assessed for loss of access to fishing grounds as a result of activities associated with the Proposed Development and other plans and projects in the region. Overall, there were no significant cumulative effects identified for any plans, projects, or activities in the CEA for commercial fisheries.<br><br>No transboundary effects with regard to commercial fisheries from the Proposed Development were predicted on the interests of other states. | Dropped Objects<br><br>A dropped objects plan will be developed for reporting and recovery of dropped objects where they pose a potential hazard to other marine users and is anticipated to be secured within a Marine Licence condition. | |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| Marine Archaeology<br><br>• sediment disturbance and deposition leading to indirect impacts on marine archaeology receptors (the exposure or burial of receptors);<br><br>• direct damage to marine archaeology receptors (e.g. wrecks, debris, submerged prehistoric receptors (palaeolandscapes and associated archaeological receptors);<br><br>• direct damage to coastal/intertidal archaeological remains through cable installation at the landfall site;<br><br>• alteration of sediment transport regimes leading to potential erosion or burial of archaeological sites; and<br><br>• change of use: effects on Historic Seascape Character. | Sediment disturbance and deposition leading to effects on known marine archaeology was deemed to be of minor adverse significance which is not significant in EIA terms. The indirect impacts on marine archaeology receptors during the construction, operations and maintenance and decommissioning of the Proposed Development is predicted to be of local spatial extent, short term duration (though impacts from sediment deposition may be longer term), intermittent and medium reversibility. It is predicted that the impact will affect marine archaeology indirectly and may result in a benefit to sites, through additional burial, though this is likely to be limited in extent. Exposure of sites is mitigated through use of the protocol for reporting finds of archaeological interest.<br><br>Direct damage to marine archaeology receptors was deemed to be of minor adverse significance which is not significant in EIA terms. This will be mitigated through the implementation of Archaeological Exclusion Zones (AEZs) around each known shipwreck site and potential site, and review of pre-construction surveys to inform the refined layout of infrastructure around any newly identified archaeological constraints. Provision will also be made for the recording of any new discoveries. | Proposed to be secured through a condition in the marine licence:<br>• The identification and implementation of AEZs around those sites identified as having high and medium archaeological potential Further details provided in the Outline WSI.<br>• Final cable routing, well drilling and platform construction to avoid any known archaeological constraints identified in pre-construction site investigation surveys through micro siting.<br>• The identification and implementation of Temporary Archaeological Exclusion Zones (TAEZs) based on all available information including the stated positional accuracy, the recorded size of the target and the potential archaeological significance around those records for wrecks, obstructions, debris and other sites of archaeological potential outside of the survey data coverage but within the Project boundary and appropriate TAEZs are recommended. Further | With the implementation of the mitigation measures it is concluded that there will be no significant effects arising from the Project during the construction, operations and maintenance or decommissioning phases. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | Direct damage to deeply buried marine archaeology receptors was deemed to be of minor adverse significance which is not significant in EIA terms. The implementation of a WSI and Protocol for Archaeological Discoveries (PAD) will provide a system for the reporting of any prehistoric archaeological material that may be uncovered during the lifetime of the Proposed Development.<br><br>Alteration of sediment transport regimes which may affect archaeological features is of negligible adverse significance which is not significant in EIA terms. Additionally, while impacts from erosion would be adverse, burial may lead to a beneficial effect.<br><br>Change of use effects on historic seascape character were deemed to be of no change significance and not taken forward for assessment. This was on the basis that the proposed development would be in line with the modern installations already present within the area, though would form a new type of development (CCS).<br><br>Cumulative effects were assessed for direct damage to marine archaeology receptors (e.g. wrecks, debris, submerged prehistoric receptors (palaeolandscapes and associated archaeological receptors); direct damage to coastal/intertidal archaeological remains through cable installation at the landfall site; | details provided in the Outline WSI.<br>• Archaeological input into specifications for, and archaeological analysis of, any further pre-construction geophysical and geotechnical surveys. Further details provided in the Outline WSI.<br>• Project archaeologists to be consulted in the preparation of any pre-construction Remotely Operated Vehicle (ROV)/diver surveys and, if appropriate, in monitoring/checking of data. Further details provided in the Outline WSI.<br>• Operational awareness of the location of those archaeological anomalies identified as having a low potential. Reporting through the agreed protocol (PAD) will be undertaken should material of potential archaeological interest be encountered. Further details provided in the Outline WSI.<br>• Implementation of a protocol for recording finds of archaeological interest, following the guidance for the Protocol | |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | sediment disturbance and deposition leading to indirect impacts on marine archaeology receptors (the exposure or burial of receptors)l and alteration of sediment transport regimes leading to potential erosion or burial of archaeological sites. Overall, there were no significant cumulative effects identified for any plans, projects, or activities in the CEA for marine archaeology.<br><br>No transboundary effects with regard to marine archaeology from the Proposed Development were predicted on the interests of other states. | for Archaeological Discoveries (PAD).<br>• Archaeologists to be consulted in the preparation of pre-construction cable route clearance or other pre-construction operations and, if appropriate, to carry out archaeological monitoring of such work. Further details provided in the Outline WSI.<br>• Mitigation of unavoidable direct impacts on known sites of archaeological significance: Options include i) preservation by record; ii) stabilisation; iii) detailed analysis and safeguarding of otherwise comparable sites elsewhere. Further details provided in the Outline WSI.<br>Commitment to implementation of the Offshore WSI prior to any post-consent works within the Eni Development Area and Area of Physical Project Works.<br><br>The implementation of a Written Scheme of Investigation (WSI) will ensure that, where possible, known archaeological sites are avoided, any new observations are recorded, and sites are | |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | | protected or preserved by record where required. | |
| Infrastructures and other Users<br><br>• displacement of recreational activities.<br><br>• increased SSCs and associated deposition affecting recreational diving and bathing sites;<br><br>• impacts to existing cables or pipelines or restrictions on access to cables or pipelines;<br><br>• increased SSCs and associated deposition affecting aggregate extraction areas; and<br><br>• reduction or restriction of oil and gas exploration activities (including surveys, drilling and the placement of infrastructure) | Displacement of recreational activities was deemed to be of negligible adverse significance which is not significant in EIA terms. Recreational vessels are able to alter their route, dependent on the target destination. Notices to Mariners will be promulgated regularly during the construction phase, advising of the location and nature of construction works, and information and notices will be posted at the landfall location, ensuring that recreational activities can be planned accordingly.<br><br>Increased SSCs and associated deposition affecting recreational diving and bathing sites was deemed to be of negligible to minor adverse significance which is not significant in EIA terms. Six identified recreational diving sites and nine recreational bathing sites (Southport, Ainsdale, Formby, West Kirby, Prestatyn, Rhyl, Rhyl East, Marine Lake (Rhyl) and Kinmel Bay (Sandy Cove)) are within the area within the infrastructure and other sea users regional study area. These sites may be impacted by an increase in SSCs in the short term, although as stated it is anticipated that any deposited fine sediments would be subject to redistribution under the prevailing coastal processes.<br><br>Impacts to existing cables or pipelines or restrictions on access to cables or | Application for safety zones of up to 500m during construction and during periods of major maintenance.<br><br>Where the Proposed Development cables/ pipelines will be required to cross an active cable, it is intended that a commercial 'crossing agreement' will be entered into with the cable operator. A crossing agreement based upon the ICPC Recommendation 3-10C 'Telecommunications Cable and Oil pipeline/Power Cables Crossing Criteria' (ICPC, 2014) will be used for any cable crossings. Where a cable is inactive, the Applicant will consult with the cable operator to ascertain if such a crossing agreement is required.<br><br>Promulgation of information advising on the nature, timing and location of activities, including through Notices to Mariners. To ensure the Other users are aware of operations and associated structures.<br><br>Development of and adherence to a Navigational Safety Plan (NSP). The NSP will describe | With the measures adopted as part of the Proposed Development in place (e.g. commercial crossing agreements), these impacts result in effects which are of minor adverse significance and not significant in EIA terms. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | pipelines was deemed to be of minor adverse significance which is not significant in EIA terms. Restriction of access to an active cable for inspection and maintenance activities could be critical to the operator of that cable. However, crossing and proximity agreements are common across the UKCS and there are established mechanisms for controlling the level of impact to both parties, in the form of the ICPC Recommendation 3-10C guidance. No active pipelines other than those operated by the Applicant exist within the infrastructure and other sea users local study area.<br><br>Increased SSCs and associated deposition affecting aggregate extraction areas was deemed to be of minor adverse significance which is not significant in EIA terms. Westminster Gravels Ltd dredge coarse sand deposits from the Liverpool Bay 457 dredging area and Mersey Sand Suppliers dredge coarse sand deposits from Hilbre Swash 393, a resource of value to the regional economy. Dredging operators are adaptable as they are able, to some extent, to screen out unwanted fine sediment load. Furthermore, it is known that the existing tidal currents and waves can carry fine grained sand across the area.<br><br>Reduction or restriction of oil and gas exploration activities (including surveys, drilling and the placement of infrastructure) was deemed to be of minor adverse significance which is not | measures put in place by the Project related to navigational safety, including information on Safety Zones, charting, construction buoyage, temporary lighting and marking, and means of notification of Project activity to other sea users (e.g., via Notice to Mariners).<br><br>Consultation with oil and gas operators and other energy infrastructure operators to promote and maximise cooperation between parties and minimise both spatial and temporal interactions between conflicting activities.<br><br>Development and adherence to a Cable Specification and Installation Plan (CSIP) post consent which will include cable burial where possible (in accordance with the specific policies set out in the North West Inshore and North West Offshore Coast Marine Plans (MMO, 2021)) and cable protection, as necessary.<br><br>Development and adherence to a pipeline Specification and Installation Plan which will include pipeline burial where possible and pipeline protection as necessary. | |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | significant in EIA terms. There are five currently licensed blocks overlapping with the infrastructure and other sea users local study area. These are blocks 110/13b, 11013a, 110/15a (all operated by the Applicant) and blocks 110/14a and 110/14c (both operated by Chrysaor Resources (Irish Sea) Limited (part of Harbour Energy)). There is also potential for blocks to become licenced in future (i.e. through Oil and Gas Licensing Rounds), but the assessment of this potential impact is complicated by a degree of uncertainty.<br><br>Cumulative effects were assessed for displacement of recreational activities and increased SSCs and associated deposition affecting aggregate extraction areas. Overall, there were no significant cumulative effects identified for any plans, projects, or activities in the CEA for infrastructure and other sea users.<br><br>No transboundary effects with regard to infrastructure and other sea users from the Proposed Development were predicted on the interests of other states. | Installation of infrastructure over or adjacent to existing cables or pipelines will be subject to crossing or proximity agreements between the two parties, prior to the start of the construction phase. | |
| Climate Change<br><br>• the impact of GHG emissions arising from the manufacturing and installation of the Proposed Development, including materials, transport and use of plant/offshore marine vessels; | .<br><br>The construction-stage impact due to the extraction of raw materials, manufacturing and transportation of the proposed infrastructure has been assessed. The GHG impacts were calculated to be approximately 137,772 $tCO_2e$, causing a moderate | During the construction and operational phases vessel fuel consumption will be minimised by optimising vessel scheduling, with consideration given to the co-ordination of activities and material delivery. Activities will be limited on the speed of | The potential impact of greenhouse gas (GHG) emissions due to the Proposed Development, resulting in an effect on the global atmospheric GHG concentration that contributes to climate change, |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| • the impact of GHG emissions arising from materials and use of offshore marine vessels required for operation and maintenance;<br>• the impact of GHG emissions associated with energy and fuel use during the operation phase;<br>• the impact of GHG emissions from decommissioning works (plant, fuel, and vessel use) and recovery or disposal of materials; and<br>• the impact of $CO_2$ transportation, sequestration and long-term storage. | adverse effect that is significant. These impacts are immediate at the time of construction.<br>The operational phase GHG effects arise due to the energy requirement from activities on the offshore platforms, material replacement, and vessel and helicopter movements. Such emissions total 81,661 $tCO_2e$, and account for operation and maintenance emissions over the lifetime of the Proposed Development (25 years). The operational GHG impact of the Proposed Development has been determined to have a minor adverse effect that is not significant.<br><br>The construction- and operational-stage GHG effects have been minimised through the reduction of emissions associated with vessel movements by specifying the use of lower sulphur-content fuel, ensuring an efficient and optimised vessel schedule, and avoiding the use of older vessels. Operational GHG effects have been further minimised through the implementation of energy efficiency measures to reduce operational energy consumption at the offshore platforms.<br>.<br>.<br>The whole-life impact of the Proposed Development (considering the impact of the Proposed Development over its lifetime) has been determined to have a beneficial effect that is significant, in line with the definitions of IEMA's guidance for GHG impact assessment. Although a significant initial carbon | vessels, and fuel used will have a low sulphur component (0.1%). Vessels older than 20 years will not be used.<br><br>During the operational phase, energy demand associated with the OPs will be reduced through energy efficiency opportunities. These include the use of efficient low loss transformers, variable frequency drives (VFDs) on $CO_2$ compressors, LED light bulbs, low voltage electrical installations, compressor efficiency specification and optimisation, efficient air coolers, energy monitoring systems (to comply with ISO 50001 certification), and Real Time Monitoring and Advanced Process Control (a computer-based algorithm that automatically optimises the process parameters and promotes a reduction in energy consumption from approximately 3% to 7%).<br><br>During the operational phase fugitive emissions will be monitored through a Leak Detection and Repair (LDAR) programme as part of the preventative maintenance activities, to avoid or minimise their presence as low as reasonably practicable. | has been assessed and reported in the ES.<br><br>The $CO_2$ that will be stored within depleted oil and gas reservoirs, enabled by the Proposed Development over its operational lifetime (25 years), approximately 110,250,000 $tCO_2$ will be removed and stored. When combined with the emissions associated with periodic venting of the infrastructure during routine maintenance, the total emissions captured during the operational lifetime of the Proposed Development totals - 110,247,682 $tCO_2e$. This has been determined to have a beneficial effect that is significant.<br>It should be noted that such a beneficial effect should not be considered in isolation, as onshore infrastructure forming part of the wider carbon capture and storage (CCS) project also plays a role in enabling the capture and transportation of $CO_2$ to the underground storage. When considering the emissions associated with all projects part of the wider CCS project, a net total of -109,730,517 $tCO_2e$ will be avoided (accounting for total emissions associated construction, operation, and decommissioning). |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | cost of manufacturing and installation is incurred, the scale of $CO_2e$ that can be captured during the Proposed Development's lifetime ensures that the Proposed Development meets policy goals for the rate of carbon reduction in the context of UK carbon budgets.<br><br>Cumulative effects were assessed for cumulative changes in GHG emissions from other energy generation sources and found to have a beneficial significance.<br><br>No transboundary effects with regard to climate change from the Proposed Development were predicted on the interests of other states. | At the end of the Proposed Development's lifetime, materials removed during decommissioning will be recycled where practicable. | |
| Shipping and Navigation<br><br>• vessel displacement leading to increased vessel to vessel collision risk between third-party vessels.<br><br>• increased vessel to vessel collision risk between a third-party vessel and a project vessel.<br><br>• vessel to platform allision risk.<br><br>• reduced access to local ports.<br><br>• anchor interaction with subsea cable.<br><br>• fishing gear interaction with subsea cable. | Vessel displacement leading to increased vessel to vessel collision risk between third-party vessels was deemed to be of broadly acceptable adverse significance (not significant in EIA terms) to the shipping and navigation receptors within the Proposed Development. In the event of a collision incident between third-party vessels, the most likely consequences are minor contact between the vessels resulting in minor damage to property and minor reputational effects on business but no perceptible effect on people. However, regulations are in place to ensure that the likelihood of collisions are reduced.<br><br>Increased vessel to vessel collision risk between a third-party vessel and a | Promulgation of information advising on the nature, timing and location of activities, Safety Zones and advisory safe passing distances, including through Notices to Mariners.<br><br>Lighting and marking of project vessels.<br><br>Guard vessel and/or temporary Aid to Navigation (AtoN)<br><br>Use of guard vessels at cable exposures<br><br>Advisory safe passing distances and safety zones | With the measures adopted as part of the Proposed Development in place (e.g. Marine coordination to manage project vessel agreements), these impacts result in effects which are of adverse significance and not significant in EIA terms. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| • vessel grounding due to reduced under keel clearance;<br>• interference with magnetic compasses; and<br>• reduction of emergency response capability due to increased incident rates for SAR responders and increased demand on the available resources | project vessel was deemed to be of broadly acceptable adverse significance (not significant in EIA terms) to the shipping and navigation receptors within the Proposed Development. The reasoning is similar to that presented in the point above.<br><br>Vessel to platform allision risk was deemed to be of broadly acceptable adverse significance (not significant in EIA terms) to the shipping and navigation receptors within the Proposed Development. A 500 m safety zone will be in place around infrastructure to reduce the potential for vessel to platform allision.<br><br>Reduced access to local ports was deemed to be of Moderate adverse significance (not significant in EIA terms) to the shipping and navigation receptors within the Proposed Development. Cable installation and Landfall construction works may result in some disruption to vessels using the Port of Mostyn, however, due to the localised and temporary nature of cable installation works in the Welsh Channel, the disruption to port access is reduced.<br><br>Anchor interaction with subsea cable was deemed to be of Moderate adverse significance (not significant in EIA terms) to the shipping and navigation receptors within the Proposed Development. While exposed any vessel anchor could interact with the cables. If an anchor becomes snagged | Marine coordination to manage project vessel movements<br><br>Vessel Management Plan<br><br>Development of and adherence to an Environmental Management Plan (EMP) that will be prepared and implemented during the construction, operational and maintenance and decommissioning phases of the Proposed Development. The EMP will include appendices detailing actions to minimise Invasive Non-Native Species (INNS) (the INNSMP), and a Marine Pollution Contingency Plan (MPCP) will be developed which will include planning for accidental spills,<br><br>address all potential contaminant releases and include key emergency contact details<br><br>The Applicant is committed to marking and lighting the project in accordance with relevant industry guidance and as advised by relevant stakeholders including the MCA, Civil Aviation Authority (CAA) and Trinity House. This will include appropriate lighting and marking of Offshore Platforms (OPs). The Applicant will also | |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | on the cable, there could be a risk of injury in trying to free it. If the anchor cannot be freed the safest action is to slip it, and not attempt to raise or cut the cable. However, mitigation includes circulation of information to make mariners aware of the exposed cable and use of guard vessels where cable exposures are considered to present significant risk to navigation, will reduce the likeliness of this impact.<br><br>Fishing gear interaction with subsea cable was deemed to be of broadly acceptable to tolerable adverse significance (not significant in EIA terms) to the shipping and navigation receptors within the Proposed Development. There is higher risk of snagging from demersal gear if the cable is exposed, however, having a Fisheries Liaison Officer (FLO) in place and circulation of information (e.g. via Kingfisher and local communications) will help ensure fishers are aware of the exposed cable and avoid fishing directly over it. In addition, guard vessels will be used in any areas where cable exposures are considered to present significant risk to fishing gear snagging.<br><br>Vessel grounding due to reduced under keel clearance was deemed to be of tolerable adverse significance (not significant in EIA terms) to the shipping and navigation receptors within the Proposed Development. Should a vessel grounding occur, the most likely consequences are minor | ensure the project is adequately marked on nautical charts.<br><br>Development and adherence to a Cable Specification and Installation Plan (CSIP) post consent which will include cable burial where possible (in accordance with the specific policies set out in the Northwest Inshore and North West Offshore Coast Marine Plans (MMO, 2021)) and cable protection, as necessary.<br>Where practicable any requirements for cable protection will be compliant with MGN 654 | |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | damage to property and minor reputational effects on business but no perceptible effect on people. However, the maximum height of cable protection will be 0.8 m. The average draught of vessels crossing the Physical Work Area was 5.1 m, with a maximum draught of 14 m, recorded crossing the cable route within the Liverpool Bay TSS in approximately 25 m of water depth, therefore this impact is unlikely.<br><br>Interference with magnetic compasses was deemed to be of broadly acceptable adverse significance (not significant in EIA terms) to the shipping and navigation receptors within the Proposed Development. The majority of commercial vessel traffic uses non-magnetic gyrocompasses as the primary means of navigation, which are unaffected by Electro Magnetic Frequency (EMF). Therefore, in general it is considered unlikely that any EMF interference created by the proposed cables will have a significant impact on vessel navigation near the Proposed Development.<br>Reduction of emergency response capability due to increased incident rates for SAR responders and increased demand on the available resources was deemed to be of broadly acceptable adverse significance (not significant in EIA terms) to the shipping and navigation receptors within the Proposed Development.<br><br>Increased vessel activity during the construction phase may reduce | | |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | emergency response capability by increasing the number of incidents or reducing access for the responders. However, Due to the limited number of vessels involved and temporary nature of the construction phase works and given that the proposed new Douglas CCS platform will be unmanned and within the existing Douglas Complex, this risk is reduced.<br><br>Cumulative effects were assessed for vessel displacement leading to increased vessel to vessel collision risk between third-party vessels, increased vessel to vessel collision risk between a third-party vessel and a project vessel, vessel to platform allision risk, reduced access to local ports, anchor interaction with subsea cable, fishing gear interaction with subsea cable, vessel grounding due to reduced under keel clearance, interference with magnetic compasses, and reduction of emergency response capability due to increased incident rates for SAR responders and increased demand on the available resources. Overall, there were no significant cumulative effects identified for any plans, projects, or activities in the CEA for shipping and navigation.<br><br>No transboundary effects with regard to shipping and navigation from the Proposed Development were predicted on the interests of other states. | | |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| Inter-Related effects<br><br>Groups:<br>• Physical environment.<br>• Biological environment.<br>• Human environment. | For all receptor groups identified, following the implementation of measures adopted as part of the Proposed Development and further mitigation (if required), impacts arising during the construction, operations and maintenance and decommissioning phase are unlikely to result in significant project-lifetime effects.<br><br>All the potential receptor-led effects identified during the construction, operations and maintenance and decommissioning phase of the Proposed Development have already been considered within the relevant chapters of the ES. | | Based on one, or a combination, of the analysed factors, the overall significance of any inter-related effects was not judged to increase above the significance value assessed for each individual topic. |

# 5. POINT OF AYR TERMINAL

## 5.1. COMPONENTS

5.1.1. A Town and Country Planning Application (TCPA) (FUL/000246/23) was approved subject to completing Legal Agreement on 23rd May 2024.

5.1.2. The project proposals at the PoA Terminal comprise:

- Modification to the PoA Terminal- this includes disinvestment of redundant natural gas infrastructure (which cannot be repurposed for use with $CO_2$) and installation of new assets and equipment (such as $CO_2$ Compressor Units) to enable the PoA Terminal to receive and export $CO_2$ to offshore fields for storage;
- Foreshore Works- this includes removal of the existing Shut Down Valve (SDV) which is installed in the Foreshore Area, west of the PoA Terminal. The SDV is currently located on the existing natural gas pipeline which runs from the PoA Terminal to the offshore Douglas platform in Liverpool Bay (the Foreshore Pipeline); and
- Installation of electrical and fibre optic cables (the Foreshore Cables) from the PoA Terminal to the Mean Low Water Spring (MLWS) to the north-west of the PoA Terminal.

5.1.3. The Red Line Boundary (the area to be included in the PoA application) is shown in Figure 5-1.

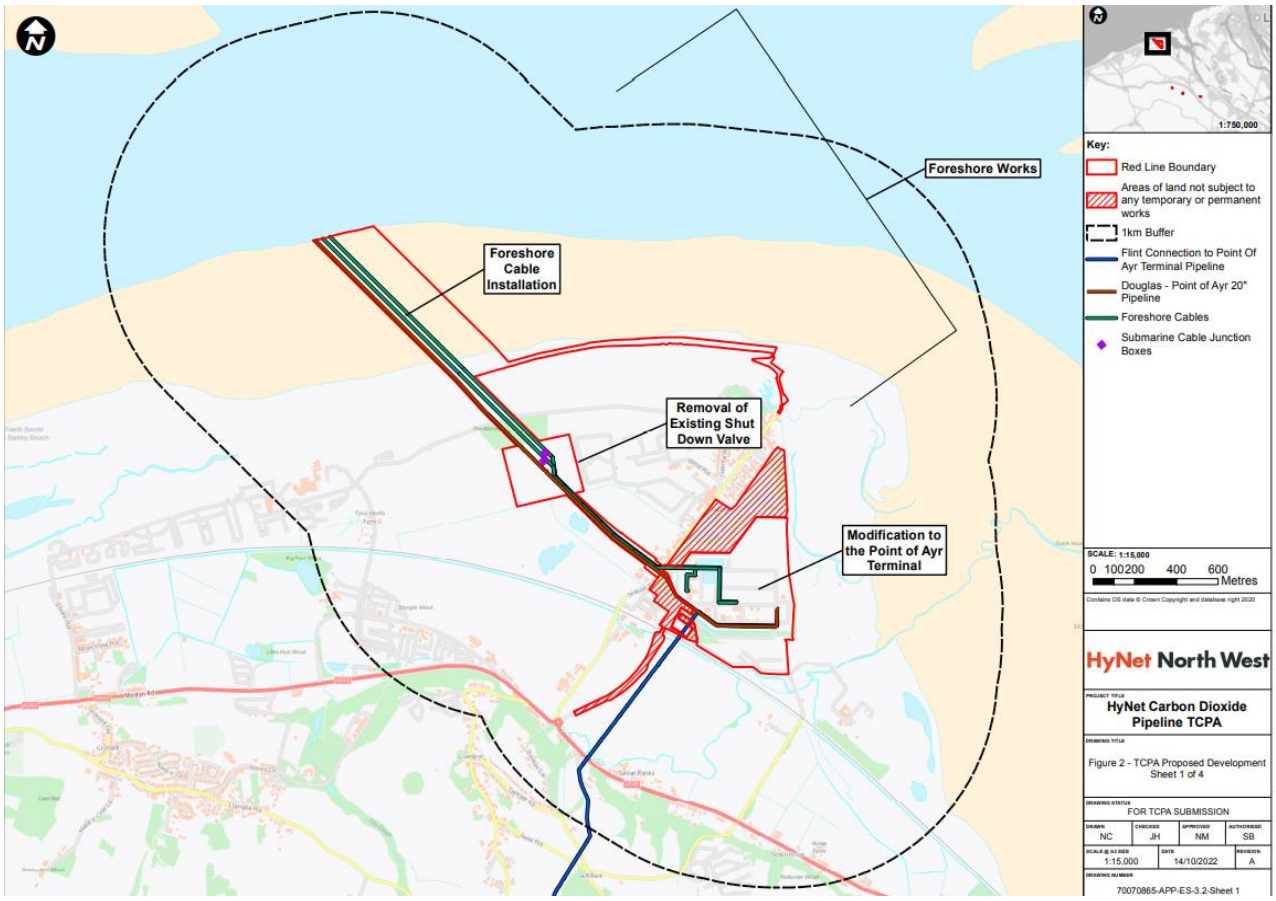


**Figure 5-1 PoA TCPA Proposed Development**

## 5.2. SITE LOCATION

5.2.1. PoA is in Flintshire, north-east of Wales. The PoA Proposed Development is located entirely in Flintshire Wales.

5.2.2. The PoA Terminal and the Foreshore Works components (located within the Foreshore Area) of the TCPA Proposed Development includes the extent of the existing PoA Terminal and stretches from there to the MLWS, along the existing natural gas pipeline (the Foreshore Pipeline). This stretch also includes an existing SDV in the agricultural fields to the south of the Talacre dune system on land forming part of Warran Farm. The PoA Colliery is located adjacent to the south/ south-east of the existing PoA Terminal.

5.2.3. The Foreshore Cables will commence from a connection point within the PoA Terminal. It is anticipated that the buried depth of the cables will be a minimum of 1.1 m, however the depth may be greater for the trenchless crossings to ensure sufficient depth to cross obstructions.

5.2.4. The route of the Foreshore Cables will be contained within the Red Line Boundary to the north-west of the PoA Terminal. The route broadly follows the alignment of the existing Foreshore Pipeline (whilst keeping a safe proximity from it), along its east side, to seek to contain the Foreshore Cables within areas of land which will have been previously disturbed during installation of the Foreshore Pipeline.

5.2.5. The Foreshore Cable route heads out of the PoA Terminal to the north-west of the Site to the disinvested SDV where there will be two new Submarine Cable Junction Boxes, where the onshore and offshore parts of the cables will be spliced together (to connect the onshore and offshore sections of the cables). It will then continue to the north-west at which point it crosses the Talacre dune system, until it reaches the MLWS.

5.2.6. The Submarine Cable Junction Box containers will be located along the cable routes adjacent to the existing field access track. Both containers will be approximately 5m x 3m x 3.5m, above-ground in two separate enclosures, and will house the Submarine Cable Junction Boxes where the cables will be spliced. The containers are likely to be made of steel, surrounded by a fence and painted green to RAL 6011, surrounded by a hedge.

5.2.7. The location of the proposed PoA Terminal vent stack will be in the same location as the existing flare unit.

## 5.3. CONSTRUCTION COMPOUNDS

5.3.1. Temporary construction compounds will be required and will be established at the start of the construction programme. A centralised compound will be located to the southeast of the PoA Proposed Development. The centralised compound will be used for storing plant and materials and providing staff offices and welfare facilities. These

centralised compounds will be in place for the duration of the construction stage.

5.3.2. A series of smaller compounds, which are referred to as localised compounds, will be required to support the Foreshore Works.

## 5.4. CONSTRUCTION METHOD

The main components of the construction programme compromise the following stages:

- Disinvestment works at the PoA Terminal;
- Removal of the existing foreshore SDV;
- Construction of the Foreshore Cables; and
- Preparation, installation and commissioning of new/reused equipment at the PoA Terminal.

## 5.5. SUMMARY OF ENVIRONMENTAL EFFECTS AND PROJECT SPECIFIC MITIGATION

5.5.1. Table 5-1 summarises the findings of the EIA process and the ES conclusions.

## Table 5-1 – Point of Ayr Terminal – Summary of Environmental Effects

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| Air Quality | There are a number of likely significant effects associated with the construction phase of the PoA and air quality. These include:<br>• Moderate adverse effect (significant) to ecological sites from earthworks during HDD;<br>• Moderate adverse effect (significant) to ecological sites from trackout during Foreshore Cable trench digging and SDV Removal associated with the Foreshore Works; and<br>• Moderate adverse effect (significant) to ecological sites from demolition during modification to the PoA Terminal and SDV Removal.<br>The decommissioning phase also identified a significant effect:<br>• Moderate adverse effect (significant) to ecological sites from demolition during PoA decommissioning.<br>During the operational phase, no significant effects have been identified. | To reduce any effects associated with the Site, embedded mitigation will be implemented. This will be through a DMP and a CEMP.<br>There are also several construction site mitigation measures that have been identified and should be enforced, these are as follows:<br>• Developing and implementing a stakeholder management plan;<br>• Management of all dust and air quality complaints, including remedial action.<br>• Monitoring of dust emissions.<br>• Preparing and maintaining the Site to ensure dust causing activities are located away from sensitive receptors and appropriately screened.<br>• Operating vehicle/ machinery to reduce emissions, for example by ensuring all vehicles are switched off when stationary.<br>• Sustainable travel measures such as developing and implementing a CTWMP and Interim Worker Travel Plan (IWTP);<br>• Reducing dust emissions from operations by using dust suppression techniques such as water sprays, local extraction and using covered tips;<br>• Sustainable waste management through avoiding bonfires and burning of materials.<br>• Measures specific to demolition such as effective water suppression.<br>• Measures specific to earthworks such as revegetating earthworks and minimising stockpile surfaces.<br>• Measures specific to construction such as ensuring fine powder materials are delivered and stored appropriately to prevent dust. | Following implementation of the mitigation measures identified, no significant adverse or beneficial Air Quality residual effects have been identified for the construction, operation, and decommissioning stages of the TCPA Proposed Development. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | | • Measures specific to trackout such as using water assisted dust sweepers, implementing a wheel wash system, and ensuring vehicles entering and leaving Sites are covered; and<br>• Controlling emissions from venting through appropriate sizing of the vent valve. | |
| Climate Resilience | The ES has identified a number of moderate to large adverse impacts (significant) in relation to climate resilience.<br>The following significant effects have been identified.<br>During the construction phase:<br>• Flooding of Sites and components.<br>• Existing drainage infrastructure overwhelmed leading to surface flooding and siltation.<br>• Damage from high winds and rain infiltration into components.<br>• Health and safety risks from heatstroke and UV radiation; and<br>• Health and safety risks from extreme temperatures and winds.<br>During the operational phase:<br>• Overheating of Sites.<br>• Health and safety risks from heatstroke and UV radiation.<br>• Health and safety risks from extreme temperatures and winds.<br>• Health and safety risks to visiting the Site due to flooding; and<br>• Impeded access to PoA/ BVSs from flooding affecting staff, visitors, emergency services.<br>During the decommissioning phase:<br>• Flooding of Sites and components.<br>• Existing drainage infrastructure overwhelmed leading to surface water flooding and siltation.<br>• Shrinking and cracking of soils;<br>• Damage from high winds and rain infiltration into components.<br>• Overheating of equipment and fire;<br>• Health and safety risks from heatstroke and UV radiation; and | Measures will be put in place to reduce the effects on the construction sites and construction workers, and these are included within the Register of Environmental Actions and Commitments (REAC).<br>Some of the measures within this document include:<br>• Ensuring welfare facilities are cooled.<br>• Provision of appropriate Personal Protective Equipment (PPE);<br>• Switching off machinery when not in use; and<br>• Ensuring sufficient drainage capacity.<br>Other plans will be produced which will act as mitigation measures. These plans include an Outline Surface Water Drainage Strategy, SMP, a Health and Safety Management Plan, a Business Continuity or Emergency Access Plan and DEMP. | Following implementation of the mitigation measures identified, no significant adverse or beneficial Climate Resilience residual effects have been identified for the construction, operation, and decommissioning stages of the TCPA Proposed Development. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | • Health and safety risks from extreme temperatures and winds. | | |
| Cultural Heritage | During the construction phase of the Proposed Development, significant effects associated with disturbance to historic assets have been identified. The four heritage receptors associated with the significant effects are:<br>• Wat's Dyke.<br>• Potential remains associated with the Second World War defensive structures and RAF target practices.<br>• Potential remains associated with the Second World War crash sites; and<br>• Evidence of early medieval activity on or near the dykes.<br>No significant effects on above ground historic assets have been identified during operation.<br>The decommissioning phase has been scoped out of the assessment on the basis that all works will be undertaken within the Red Line Boundary for the TCPA Proposed Development and therefore there will be no further impact on buried archaeology. | Mitigation measures that have been put in place to reduce the effects on Cultural Heritage include:<br>• A watching brief over specific areas of the Site;<br>• A pre-construction walk-over;<br>• All Site staff and contractors will also be made aware of the Protocol for Archaeological Discoveries: Offshore Renewables Projects (Ref. 8.16), which details the process for dealing with any unexpected discoveries within the intertidal zone; and<br>• A Written Scheme of Investigation (WSI) to be agreed with the LPA. | Following mitigation, no potential significant residual effect is predicted during the construction or operation stages on below ground archaeology or above ground heritage assets. |
| Biodiversity | Within the study area there a number of species and designated sites for nature conservation.<br>During the construction phase there will be significant effects from habitat loss, damage and disturbance on some international designated sites, national designated sites, local designated sites, habitats of conservation importance, birds, amphibians, sand lizards, fish and aquatic macroinvertebrates.<br>Across the operational phase any direct impacts generated from PoA Terminal and the Foreshore works are anticipated to be negligible.<br>During the decommissioning phase, significant effects such as habitat degradation from pollution and disturbance to fauna are anticipated. These include to designated local sites, birds and fish. | There are a number of mitigation measures and enhancements that will be in place to reduce effects on biodiversity. Some measures are described below.<br>Habitat loss, including tree and hedgerow removal, will be avoided as far as feasible, with any existing habitats of value to be removed only where essential to the completion of the works. Habitats that will not be permanently lost are to be reinstated upon completion of the works.<br>An Outline CEMP will be produced, within this mitigation measures will include dampening down areas to control dust, avoiding works during prolonged dry weather to control dust emissions, working during daylight hours as far as possible to minimise the need for artificial lighting, and minimising habitat loss as far as feasible.<br>It is likely that SSSI assent will need to be obtained from Natural Resources Wales (NRW) to legally permit the works, detailing how the | Following implementation of the mitigation measures identified, no significant adverse or beneficial Biodiversity residual effects have been identified for the construction, operation and decommissioning stages of the TCPA Proposed Development. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | | works will be carried out, and how impacts will be minimised.<br>As far as feasible, construction works within 8m of any of the watercourses will be avoided where practicable to minimise the potential for any pollution incidents.<br>The two badger active setts located within the Foreshore Works area will be avoided in the first instance, with a sufficient buffer zone to avoid significant disturbance to the setts. Where heavy machinery is being used, a minimum buffer zone of 30m must be in place around the setts. Where lighter machinery may be used, this buffer zone can be reduced to 20m. Works to be carried out using hand tools only may be carried out up to 10m from an active sett.<br>Works will be undertaken during certain months of the year to avoid disturbance of species. These species include badgers, birds, Great Crested Newts (GCN), sand lizards and invasive non- native species.<br>Works will be undertaken under a Precautionary Working Method Statement and a toolbox talk.<br>A Detailed Method Statement (DMS) will be prepared.<br>A Species Conservation Plan (SCP) will be produced. | |
| Greenhouse Gases | During the construction phase, the effects on GHG are considered to be minor adverse. The magnitude of embodied emissions and GHG emissions is predicted to have a minor adverse effect during construction.<br>During the operational phase, there are likely to be moderate adverse (significant) effects on GHG. This effect is determined through the magnitude of GHG emissions from operation energy use, repair, maintenance, replacement and refurbishment, venting and fugitive gas emissions as a result of the operation of the TCPA Proposed Development. This is predicted to have a moderate adverse (significant) effect.<br>The magnitude of GHG emissions as a result of the operation of the TCPA Proposed Development and avoided emissions | Several mitigation measures will be put in place to reduce the impacts of GHG. Some of which include:<br>• The Proposed Development will reflect the carbon reduction hierarchy and include feasible measures to reduce emissions;<br>• Reuse/ recycling materials and components;<br>• Use of sustainable materials and local waste facilities;<br>• Avoid landfill disposal; | Following the implementation of mitigation, no significant adverse or beneficial residual effects on GHG emissions are likely to occur during construction or decommissioning stages.<br>A moderate adverse (significant) effect has been identified for the |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | associated with the Project overall is predicted to have a Beneficial (Significant) effect.<br>The effect during the decommissioning phase is likely to be minor adverse and are based on the magnitude of GHG emissions from plant use, the transport of waste from Site and the disposal of waste. | • Use of modern and efficient low powered electricity; and<br>• Use safe sensitive driving techniques. | operation stage excluding the avoided emissions captured from the plants that will feed into the Carbon Dioxide Pipeline system. A beneficial significant effect is anticipated when considering the avoided emissions captures from the plants that will feed into the $CO_2$ pipeline system. |
| Land and Soils | During the construction phase the following significant effects have been identified associated with Land and Soils:<br>• Effect to controlled waters (groundwaters and surface waters) and EU designated surface waters through mobilisation of contaminants from ground works; and<br>• Sterilisation of Mineral Resource.<br>During the operational and decommissioning phase, the following significant effects have been identified:<br>Effect to controlled surface waters and EU designated surface waters through mobilisation of contaminants within the pipeline bedding. | To reduce the effects on land and soils, a DMP will be implemented. This will include a pre-demolition survey of asbestos within structures. If found, asbestos will be removed by an appropriately experienced and licenced contractor prior to any demolition works.<br>Further to this, best practice mitigation measures will be implemented, some of which include incorporation of temporary surface water drainage strategy and compliance with the MMP.<br>The Construction Contractor will appoint an appropriately qualified person (e.g., Environmental Clerk of Works (EnvCoW)) to maintain a Watching Brief for the duration of any ground excavations.<br>A CEMP will be produced, and a suitable remediation strategy will be formulated.<br>A SMP will be implemented to maintain the integrity of the soil during construction and to prevent significant loss of BMV agricultural land or other significant impact on the viability of farm practices.<br>Two ground investigations have been undertaken.<br>Below ground tanks, structures and / or pipework encountered during construction will be appropriately decommissioned and removed | Following implementation of the mitigation measures identified no significant adverse or beneficial Land and Soils residual effects have been identified for the construction, operational and decommissioning stages of the TCPA Proposed Development. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | | (where necessary) to ensure that contaminants do not enter the ground.<br>Prior to decommissioning a DEMP will be produced. | |
| Landscape and Visual | Significant Landscape effects related to construction are anticipated on the following Landscape Character Area/Aspect Areas:<br>• Tyn Mofa coastal levels;<br>• Intertidal Zone; and<br>• Point of Ayr.<br>The significant visual effects associated with construction are anticipated to be on recreational users of some PRoWs and residents of Presthaven Holiday Park.<br>During the operational phase, the greatest effect is noted to be minor adverse on landscape character. Therefore, there are no significant effects anticipated. The greatest effect on the visual receptors is noted to be moderate adverse for residential receptors off Cornist Lane represented by B9. No permanent significant effects on this receptor or any other visual receptors are anticipated.<br>There are significant landscape effects associated with the decommissioning phase. These effects are related to the following Landscape Character Area/Aspect Areas:<br>• Estuary Edge and Valleys; and<br>• Limestone Plateau.<br>Upon completion of decommissioning, it is expected that the landscape character area will return to the baseline situation and therefore no significant effects are anticipated.<br>There are significant effects associated with several visual receptors during decommissioning, which will affect recreational users of some PRoWs and residents of Gwespyr and Presthaven Holiday Park.<br>Upon completion of decommissioning at the end of the project's life, it is expected that the views will be improved from the baseline situation following the removal of the TCPA Proposed Development. Any effects at decommissioning are therefore considered to be beneficial in nature and the level of effect will be similar to that experienced at Operational Year 1. | An OCEMP will be prepared and used to implement best practice measures.<br>Other forms of mitigation that will be put in place include:<br>• Soil mounds will be used to screen views;<br>• Construction compound management will take place;<br>• A DMP will be in place;<br>• Retention and protection of existing vegetation where possible;<br>• The construction programme will be kept to a minimum;<br>• Working during darkness hours will be avoided;<br>• A SMP will be produced;<br>• Tree Preservation Orders (TPOs) will be implemented.<br>Mitigation measures during the operational period include good practice measures. | There will be a number of residual moderate adverse (significant) effects during the construction phase following mitigation on the landscape and visual receptors These significant effects are associated with:<br>• Intertidal Zone;<br>• Point of Ayre;<br>• Tyn Morfa coastal levels;<br>• PoA3- Recreational users of PoA Coastal Trail and off-road cycle route (NCN 5 and Wales Coast Path link route);<br>• PoA7- Residents of Presthaven Holiday Park;<br>• PoA9- Recreational users of Wales Coast Path/ Llanasa Bridleway;<br>• PoA11- Recreational users of Llanasa Footpath; and |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | | | • PoA12- Recreational users of PoA Coastal Trial and off-road cycle route (NVN 5 and Wales Coast Path link route). |
| Major Accidents and Disasters | There are a number of potential major accident and/ or disaster events during construction, operation and decommissioning which have been identified as high risk. These include:<br>• Striking underground services/ utilities leading to release of natural gas and electricity; and<br>• Striking underground Foreshore Cables<br>These risks could lead to the harm of people or a fire and/ or explosion or release of harmful gas. | To avoid any major accidents taking place at PoA, the Construction Contractor(s) will commit to managing the Site in accordance with the following non-exclusive list which involves standards and systems.<br>• Programme of hazard studies to produce an inherently safe design and to ensure residual risks are managed to be ALARP as required by health and safety legislative drivers;<br>• Environmental, Health & Safety Management systems;<br>• Manage all construction risks in accordance with the CDM construction phase Plan;<br>• Supplier management environmental, health & safety standards;<br>• Risk management systems; and<br>• Construction and Environmental Management systems (including CEMP). | With the implementation of mitigation that has been put in place, it is considered that all of these risks will be managed to be as low as reasonably practicable, in accordance with professional judgement and relevant guidance. |
| Materials and Waste | The anticipated volumes of materials and waste from the construction of the TCPA Proposed Development have been compared against regional and national landfill capacity or materials / resource availability to assess if the TCPA Proposed Development will affect regional resource availability and landfill capacity.<br>No significant effects have been associated with material resource consumption or remaining landfill capacity during the construction phase of the Proposed Development. | Since there are no significant effects predicted on materials and waste, no additional mitigation measures are required. There are however several measures that have been included within the REAC that can be applied where practicable, including:<br>• Identification and specification of material resources that can be acquired responsibly;<br>• A MMP should be produced; | No significant adverse or beneficial Materials and Waste residual effects have been identified for the construction stage of the TCPA Proposed Development. The operational and decommissioning stages have been |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | This assessment only considers the construction phase. The operational and decommissioning Phases have been scoped out of the Materials and Waste assessment.<br>. | • Engage early with Construction Contractor(s) to identify possible enhancement and mitigation measures to identify opportunities to further reduce any waste through collaboration and regional synergies. | scoped out of the Materials and Waste assessment. |
| Noise and Vibration | There will be localised and time limited significant adverse residual effects during the construction and decommissioning phase of the TCPA Proposed Development.<br>Construction phase impacts are outlined below:<br>• There are medium to high magnitude noise impacts expected during HDD for the Foreshore Cables;<br>• During HDD for the Foreshore Cables, there is the potential that HDD will require 24-hour working, including evening and night-time periods when a higher number of receptors will be subject to medium and high adverse noise impacts;<br>• Based on a 4 week estimated schedule and works being undertaken Monday to Friday and Saturday mornings, with no working on evenings or Saturday afternoons and Sundays, there is the potential for medium or high day-time noise impacts at Station Road; and<br>• If night-time working associated with the trenchless crossing at the dunes is required, a high and medium magnitude of impact is predicted at the closest mobile home units to the works, namely Talacre Beach Resort to the east, immediately adjacent to the Red Line Boundary.<br>Therefore, the construction noise and vibration effects are expected to be significant.<br>No significant noise effects are associated with the operational phase of the Proposed Development.<br>The decommissioning noise and vibration effects are expected to be significant. These effects derive from:<br>• The adverse vibration effects from vibratory compaction arising during the project end of life decommissioning activities are expected to be similar to those for the decommissioning of the existing assets within PoA Terminal no longer required for $CO_2$ service. | To reduce effects generated through noise and vibration mitigation will be implemented.<br>Some mitigation measures include:<br>• An OCEMP;<br>• A NVMP;<br>• Acoustic enclosures for ancillary equipment which is kept above ground for the whole duration of the trenchless installation activities;<br>• Best practice construction working methodologies; and<br>• A DEMP. | There will be a moderate significant effect associated with both the construction of the PoA on noise and vibration following mitigation. This significant effect is associated with the construction of the HDD. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| Population and Human Health | A number of moderate adverse (significant) effects have been identified in regards to population and human health.<br>During the construction phase, there is likely to be significant effects resulting from:<br>• Disruption to private property;<br>• Disruption to access to community land and assets;<br>• Disruption to local businesses; and<br>• Disruption to routes for walkers, cyclists and horse riders.<br>There are also negative effects likely on human health, noise and loss of visual amenity.<br>However, positive effects on employment are likely from the Proposed Development including an increase in local expenditure, construction employment and health outcomes.<br>No significant effects have been identified in relation to the operational stage of the Proposed Development.<br>The decommissioning stage has been scoped out of the assessment. | Certain mitigation measures will be implemented to reduce the effects that could be caused to the population and human health. For example, the public will be informed in relation to timings and duration of proceedings, construction compounds will be set out and managed to reduce impacts on private property, clear signage will be put out to help locate PRoW for the public.<br>Further to the measures mentioned above, vehicular access will be maintained at all times to community facilities which perform emergency service activities. A DMP has been prepared and works adjacent to Point of Ayr Holiday Park and Haven Presthaven Holiday Park, where practicable will be programmed outside of the peak holiday seasons. | No significant adverse or beneficial Population and Human Health residual effects have been identified for the construction or operational phases of the TCPA Proposed Development. |
| Traffic and Transport | The following effects relating to Traffic and Transport during construction have been assessed and their impact on links that are sensitive to changes in traffic volumes have been calculated:<br>• Severance<br>o Moderate Impact receptors: 1<br>o Minor Impact receptors: 2<br>o Negligible Impact receptors: 1<br>• Fear and Intimidation<br>o Moderate Impact receptors: 1<br>o Minor Impact Receptors: 2<br>o Negligible Impact receptors: 1<br>• Pedestrian Amenity<br>o Negligible Impact Receptors: 4<br>• Driver Delay<br>o Moderate Impact receptors: 1<br>o Minor Impact Receptors: 1<br>o Negligible Impact Receptors: 2<br>• Pedestrian Delay<br>o Negligible Impact Receptors: 3<br>Moderate Impacts are considered to be significant. | To reduce any significant effects proposed on Traffic and Transport, mitigation measures will be implemented. Such measures include:<br>• A CTMP;<br>• An OCEMP; and<br>• Temporary diversions will be in place for access to the PRoW that will be affected. | No significant adverse or beneficial Traffic and Transport residual effects have been identified for the construction stage of the TCPA Proposed Development. The operational and decommissioning phases have been scoped out of the Traffic and Transport assessment. |
| Water Resources and Flood Risk | Significant effects are likely during both the construction and decommissioning phase of the Proposed Development. | Mitigation measures likely to be required to address the significant effects include:<br>• An CEMP; | No significant adverse or beneficial Water Resources and Flood |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| | The significant effects associated with the construction and decommissioning phase include:<br>• Impact to water quality and hydromorphology by entrainment of materials, particularly associated with loose sediment/material either exposed through excavation or stockpiled on Site; and<br>• Impact to water quality by spillage of pollutants, particularly associated with poor management of harmful chemicals and maintenance of construction plant.<br>No significant effects have been identified during the operational phase. | • A DEMP;<br>• An OCEMP;<br>• Vegetation clearance, including timing of the works, will be carefully considered;<br>• A GWMMP; and<br>• A Flood Action Plan (FAP). | Risk residual effects have been identified for the construction, operation and decommissioning phases of the TCPA Proposed Development. |
| Combined and Cumulative Effects | The Inter-Project Effects Assessment for the construction phase assessed the potential for inter-project effects for the following topics:<br>• Climate Resilience;<br>• Biodiversity;<br>• Land and Soils;<br>• Landscape and Visual;<br>• Materials and Waste;<br>• Noise and Vibration;<br>• Population and Human Health;<br>• Traffic and Transport; and<br>• Water Resource and Flood Risk.<br>The overall inter-project effects for the construction phase for each of the environmental topics were appraised to be minor adverse or negligible.<br>The Inter-Project Effects Assessment for the Operation Stage assessed the potential for inter-project effects for the following topics:<br>• Climate Resilience;<br>• Biodiversity;<br>• Land and Soils;<br>• Landscape and Visual; and<br>• Water Resources and Flood Risk.<br>The overall inter-project effects for the operational phase for each of the environmental topics were appraised to be minor adverse and the majority of these were classified as negligible.<br>No significant inter-project effects are predicted to occur during construction, operation or end-of-life decommissioning. | As no significant effects have been identified in this assessment no mitigation and enhancement measures have been proposed beyond those already stated in the technical specific mitigation throughout this table (Table 5-1). | No residual likely significant inter-project or inter-project effects have been identified. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | The following common receptors were identified in the construction stage as having the potential for inter-project effects:<br>• Residential receptors; and<br>• Recreational areas and PRoW and their users.<br>Residential receptors were the only common receptor identified in the operational and decommissioning stage with the potential for inter-project effects. Residential receptors would experience non-negligible residual effects from both Landscape and Visual and Noise and Vibration.<br>The inter-project effects are anticipated to be between negligible and minor adverse depending on receptor location. With minor adverse effects being concentrated in the vicinity of the PoA Terminal (Gwespyr and Presthaven Holiday Park). | | |

# 6. ONSHORE CARBON DIOXIDE TRANSPORTATION PIPELINE

## 6.1. COMPONENTS

6.1.1. A Development Consent Order (DCO) (Ref: EN070007) for the Onshore Carbon Dioxide Pipeline was granted on the 20th March 2024.

6.1.2. The Onshore $CO_2$ Pipeline will comprise the following:

- Approximately 36km of new underground pipeline from Ince in England to Flint in Wales.
- Fibre optic telecommunications cable alongside the pipeline to connect the above ground infrastructure.
- Four Above Ground Installations (AGI) to connect the $CO_2$ capture facilities to the new pipeline.
- Six Block Valve Stations (BVS) are required to allow sections of the new pipeline system to be isolated for maintenance purposes or in an emergency.
- The DCO Proposed Development includes an option to install an embedded pipe bridge across the Alltami Brook in case the preferred option of installing the pipeline beneath the watercourse via open-cut trench methodology is not authorised.

## 6.2. ROUTE OVERVIEW

6.2.1. The new underground $CO_2$ pipeline will run from Ince in England to Flint in Wales, passing through the local authority areas of Cheshire West, Chester Council and Flintshire Country Council. At Flint, the new pipeline will connect to an existing underground pipeline which will be repurposed to allow the onward flow of $CO_2$ to the Point of Ayr Terminal.

6.2.2. The design of the Proposed Development has evolved iteratively to take account of information obtained from consultation with stakeholders, as well as environmental studies and engineering input. This has ensured that the design is optimised to reduce or avoid environmental impacts where possible, as well as to reflect the interests of stakeholders, whilst ensuring the engineering and construction requirements are met.

6.2.3. The Proposed Development includes a route corridor within which the new pipeline will be located. The final alignment of the pipeline within this corridor will be refined by the construction contractor and their designers at the next design stage. The pipeline and all its associated infrastructure will be within the geographic boundaries set by the DCO.

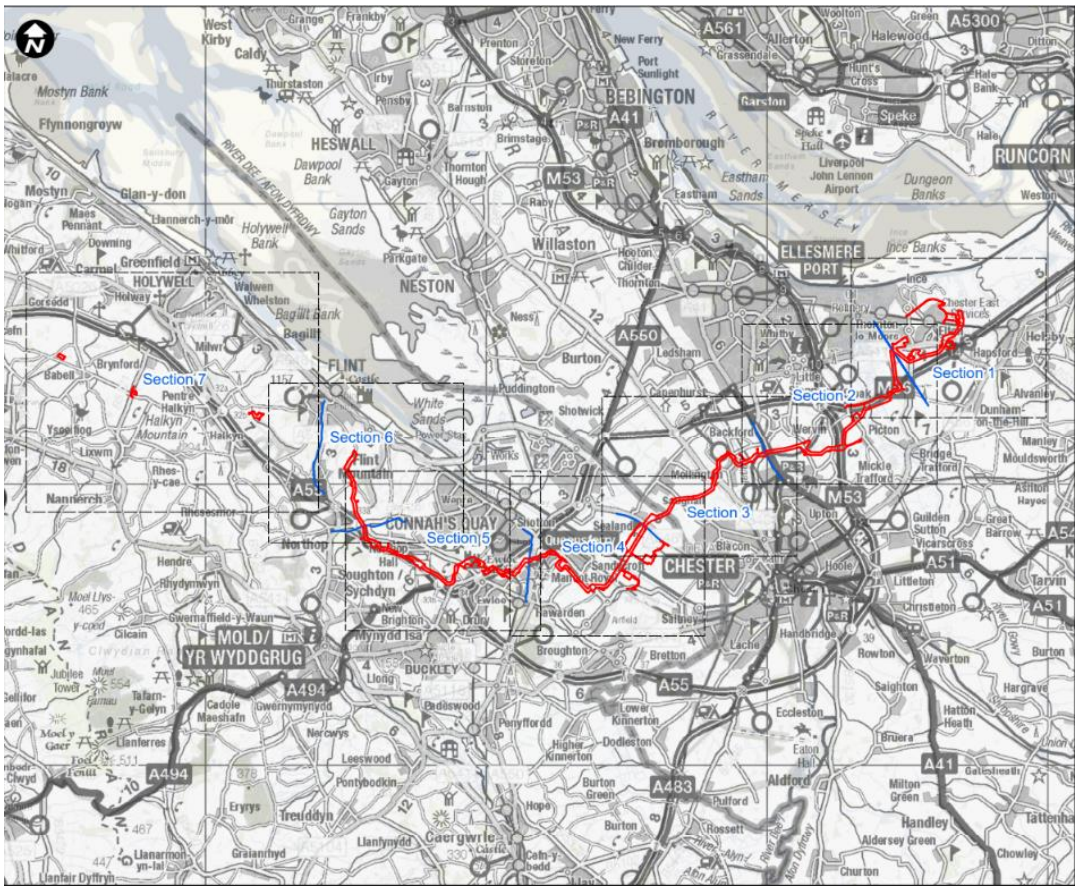


**Figure 6-1 – Onshore Carbon Dioxide Transportation Pipeline Route**

## 6.3. CONSTRUCTION

6.3.1. The construction stage is anticipated to commence in 2024 and last approximately 16 months.

6.3.2. To reduce the construction time, works will be programmed to take place concurrently, wherever this is practicable and where it does not exacerbate environmental impacts.

### CONSTRUCTION COMPOUNDS

6.3.3. Temporary construction compounds will be required and will be established at the start of the construction programme. Six main compounds, known as centralised compounds, will be located at key locations along the route of the Proposed Development. The centralised compounds will be used for storing plant and materials and providing staff offices and welfare facilities. These centralised compounds will be in place for the duration of the construction stage.

6.3.4. A series of smaller compounds, which are referred to as localised compounds, will be required to support specific works, such as the AGIs/BVSs and some watercourse crossings. In most cases, these localised compounds will be removed following completion of the works they serve, which is expected to be up to three months. However, localised compounds serving AGIs and BVSs will be in place for the duration of the construction stage.

### PIPELINE CONSTRUCTION

6.3.5. In most cases, the new pipeline will be constructed via an 'open-cut trench' method. This involves excavating a trench into which the pipe is lowered. The trench is then filled using the material that was originally excavated to create the trench. The depth of the trench will vary from approximately 2.5m – 6m. The open-cut trench construction works will be within a working area, known as the working width which will be up to 32m wide, potentially less where environmental impacts, such as vegetation loss, need to be reduced.

6.3.6. At certain locations where the pipeline needs to cross highly sensitive environmental features or existing infrastructure such as railways or major roads, a construction method known as 'trenchless crossing' will be used. This involves tunnelling the pipeline under the feature or infrastructure being crossed to avoid disturbance. The specific method selected will be decided upon during the final design stage with consideration of reducing potential environmental impacts as far as reasonably practicable.

6.3.7. A fibre optic cable will typically be installed alongside the pipe in the open trench or trenchless tunnel. However, there may be instances where the cable requires its own dedicated trenchless crossing, which will be constructed near the pipeline crossing.

### ABOVE GROUND INSTALLATION AND BLOCK VALVE STATION CONSTRUCTION

6.3.8. The construction method for AGIs and BVSs will be similar and will typically involve:

- Construction of a permanent access track;
- Erection of secure fencing for construction works;
- Installation of utility connections;
- Earthworks to establish foundation levels;
- Construction of foundation bases and above ground structures;
- Construction of pipework and equipment and associated infrastructure; and
- Restoration of temporary land use and landscaping works.

## 6.4. OPERATION AND MAINTENANCE

6.4.1. The basis of assessment for operational life in the Environmental Statement (ES) is 25 years.

6.4.2. Once built, restrictions will be placed on the land up to circa 12m either side of the pipeline, to prevent activities which could damage it. This includes construction works and planting of large trees, however most existing activities such as farming will be able to resume.

6.4.3. The AGIs and BVSs will be operated remotely but will require periodic visits for maintenance and inspection. The new pipeline system will be monitored remotely from an existing central control room at the Point of Ayr terminal.

6.4.4. A leak detection system will be installed to remotely monitor and identify any leaks to the pipeline system. Should any be identified, the operations team would be alerted and the BVSs used to isolate the pipeline and minimise $CO_2$ loss. An anti-corrosion system will also be installed to protect the pipeline system from damage caused by corrosion.

6.4.5. During normal daily operation, there would be no venting of $CO_2$ from the Proposed Development. However, some highly infrequent controlled maintenance activities will require temporary venting of small amounts of $CO_2$. This would be performed via controlled activities at the Ince, Stanlow and Flint AGIs and is anticipated to be required approximately every two years and last a few hours across a period of up to two weeks in each instance. The venting of $CO_2$ would be via a temporary stack, which will be removed once the venting activity has taken place.

## 6.5. SUMMARY OF ENVIRONMENTAL EFFECTS AND PROJECT SPECIFIC MITIGATION

6.5.1. Table 6-1 summarises the findings of the EIA process and the ES conclusions.

## Table 6-1 – Onshore $CO_2$ Transportation Pipeline – Summary of Environmental Effects

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| Air Quality | The following air quality effects associated with the construction of the Proposed Development were identified:<br>• Dust soiling effects from track-out during pipeline trench digging and trenchless installation; and<br>• Dust soiling and ecological impacts from earthworks during trenchless installation.<br>These were all identified as moderate adverse (significant) effects prior to mitigation.<br>Odours from venting during the operational phase of the development was identified as a minor adverse effect (not significant). | Measures to control airborne pollutants during construction will be implemented through good practice and dust management measures which will be included in a Construction Environmental Management Plan (CEMP).<br><br>Measures to control emissions from temporary venting during operation will include ensuring that the maximum rate of venting is controlled through the size of the vent valve.<br><br>Air quality monitoring will be undertaken in the vicinity of the Site.<br><br>A Dust Management Plan will also be implemented, which will include measures for recording complaints and best practice measures for minimising dust. | With mitigation measures in place, no significant adverse effects on air quality are likely to occur during construction, operation, or end-of-life decommissioning. |
| Climate Resilience | An assessment of the likely significant effects during the construction phase was scoped out of the EIA.<br>During the operational phase, there is potential for shrinking and cracking of soils leading to ground destabilisation, which would have a moderate adverse (significant) impact on the $CO_2$ pipeline.<br>During the decommissioning stage, the following potential significant effects on AGIs and BVSs have been identified:<br>• Flooding of Sites and components (moderate adverse); and<br>• Overwhelming of existing drainage infrastructure leading to surface water flooding and siltation (moderate adverse).<br>The following potential significant effects on decommissioning workers have also been identified:<br>• Overheating of equipment and fire (moderate adverse);<br>• Health and safety risks from heatstroke and UV radiation (moderate adverse); and<br>• Health and safety risks from extreme temperatures and winds (moderate adverse). | Additional Ground Investigations including geotechnical and ground stability surveys (including sampling of groundwater) will be undertaken as required pre-construction to determine and address any ground stability risks.<br>A Decommissioning Environmental Management Plan (DEMP) will be prepared at the Decommissioning Stage to protect workers from climate change effects. | Following mitigation, it is anticipated there will be no residual effects during operation or decommissioning. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| Cultural Heritage | Potential environmental effects associated with direct physical impacts to heritage receptors were identified:<br>• Wat's Dyke (moderate adverse – significant);<br>• Potential for Bronze Age funerary remains (moderate or large adverse – significant);<br>• Potential Roman road remains (moderate adverse – significant);<br>• Potential Roman roadside remains (moderate adverse – significant);<br>• Potential modern earthworks/building remains relating to RAF Hawarden (slight or moderate adverse – not significant to significant);<br>• Potential remains associated with the Second World War Airspeed Oxford II N4731 crash site (moderate adverse – significant); and<br>• Roman ditch and putative structures (moderate adverse – significant).<br>A potential significant effect was also identified for features associated with the 'moated site, fishpond and connecting channel, Elton', relating to loss of associated buried archaeology (moderate adverse).<br>A further likely significant effect was also identified for 'Aston Hall and Aedocular Gateway at Aston Hall', associated with indirect impacts to setting (moderate adverse). | A programme of archaeological evaluation will be undertaken where required and will inform the development of the final mitigation strategy should additional features be identified.<br>The scope and method for undertaking each stage of evaluation or mitigation will be detailed in a Written Scheme of Investigation, which will be prepared in consultation with the archaeological advisors of the relevant local authority.<br>Good construction practices, noise and visual screening while constructing Aston Hill BVS and the Newbuild Carbon Dioxide Pipeline adjacent to the asset will limit the visual and auditory intrusion on the asset.<br>As the pipeline will be buried below ground, potential impacts on the setting of heritage assets during operation will be limited to the AGIs and BVSs and will be mitigated by landscaping around each facility to screen views. | With mitigation measures in place, there may be a significant adverse effect on any Bronze Age funerary remains that may survive during construction. There are no significant operation or decommissioning effects. |
| Biodiversity | Likely significant effects during construction have been identified for the following receptors:<br>• Statutory Designated Sites (moderate adverse – significant);<br>• Non-statutory Designated Sites (moderate adverse – significant);<br>• Habitats of Principal Importance (moderate adverse – significant);<br>• Aquatic Habitat: Watercourses (moderate adverse – significant);<br>• Great Crested Newts (moderate adverse – significant);<br>• Bats (moderate adverse – significant);<br>• Badger (minor adverse – not significant)<br>• Riparian Mammals (moderate adverse – significant);<br>• Barn Owl (moderate adverse – significant);<br>• Wintering Birds (moderate adverse – significant); | Prior to construction, a team of suitably qualified and experienced Ecological Clerk of Works (ECoWs) will be appointed to support, oversee and monitor the Construction Contractor with the implementation of measures defined within the CEMP and ensure compliance with any protected species licenses.<br>Mitigation and compensation for habitat loss will involve replacing lost habitat, such as hedgerows, in its original location and as soon as practicable after removal. Where this is not possible because, for example, there are restrictions on planting directly above the pipeline, new areas of planting are proposed.<br>Vegetation clearance will be undertaken | With mitigation measures in place, no significant adverse effects on biodiversity are likely to occur during construction, operation, or end-of-life decommissioning. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | • Breeding Birds (minor adverse – not significant);<br>• Fish (major adverse – significant); and<br>• Aquatic Macroinvertebrates (minor adverse – not significant)<br>Effects include habitat loss, mortality/injury of protected species, disturbance due to noise, vibration and light and water quality degradation.<br>Impacts arising during the operational stage of the Proposed Development are considered to be of negligible significance.<br>During decommissioning, similar impacts to those identified during the construction stage are anticipated. | outside of the bird nesting period, where possible.<br>The landscape design at each BVS and AGI will also include habitat creation. A detailed Landscape and Ecological Management Plan (LEMP) will be produced.<br>Impacts on protected species will be mitigated by further surveys before construction, where required, to avoid potential impacts and to ensure appropriate licences can be obtained from the relevant statutory bodies.<br>Sensitive areas will be fenced off to reduce disturbance and habitat loss during construction works. Lighting will be designed in accordance with best practice guidance with regards to protected species.<br>Enhancement opportunities will be sought during construction, for example the erection of bat boxes.<br>Where present, A Biosecurity Method Statement will be implemented to detail the locations and extent of any Invasive Non-Native Species (INNS). It will also include any other biosecurity concerns and appropriate measures to control, prevent further spread or eradicate the species from the area if necessary. | |
| Greenhouse Gases | The total Green House Gas (GHG) emissions arising from embodied carbon, transportation of materials to Site, transport of waste from Site, disposal of waste, plant use and Land Use, Land Use Change and Forestry (LULUCF) for the construction of the Proposed Development are estimated to be approximately 81,328 $tCO_2e$ (minor adverse).<br>The total GHG emissions arising from operation energy use, LULUCF, venting and fugitive gas emissions during the operation of the DCO Proposed Development are estimated to be approximately 12,379 $tCO_2e$ (minor adverse). | Proposed mitigation measures to reduce the GHG emissions produced include design optimisation to avoid or reduce the need to use materials, using locally sourced and sustainably produced materials and local waste disposal facilities.<br>Efficient equipment will be used during operations, such as long-life bulbs for lighting in the AGIs and BVSs. | With mitigation measures in place, no significant adverse GHG effects are predicted to occur during construction, operation, or end-of-life decommissioning.<br>Beneficial effects (significant) are anticipated due to the avoided emissions captured as part |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | The total GHG emissions arising from the operation of the DCO Proposed Development including avoided emissions associated with the Project are estimated to be approximately -106,937,621 $tCO_2e$. (Beneficial – significant).<br>The total GHG emissions arising from operation energy use, LULUCF, venting and fugitive gas emissions account for 0.01% of the avoided emissions across the lifespan of the DCO Proposed Development.<br>The total GHG emissions arising from plant use, transport of waste from Site and disposal of waste during end-of-life decommissioning of the DCO Proposed Development are estimated to be approximately 11,765 $tCO_2e$ (minor adverse). | The end-of-life decommissioning stage will maximise the potential for the reuse/repurposing, recycling and/or recovery of materials and components. | of the HyNet project that feed into the DCO Proposed Development. |
| Land and Soils | The likely effects for Land and Soil associated with the Construction stage are set out below.<br>• Contamination of controlled waters (moderate adverse – significant);<br>• Potential loss and deterioration of Best and Most Versatile (BMV) agricultural soils (moderate adverse – significant);<br>• Sterilisation of mineral resources (moderate adverse – significant); and<br>• Contamination and reduced water quality of EU Designated Surface Waters (i.e., Site of Special Scientific Interests (SSSI), Special Area of Conservation (SAC)) (moderate adverse – significant).<br>The impact on human health and on DCO infrastructure from potential contamination of soils were assessed as slight adverse (not significant).<br>The likely significant effects for Land and Soil associated with the Operational and Decommissioning Stages are set out below.<br>• Contamination of Controlled Surface Waters (moderate adverse – significant); and<br>• Contamination and reduced water quality of EU Designated Surface Waters (i.e., SSSIs, SAC) (moderate adverse – significant).<br>During the operational phase, the impact on Controlled Groundwater from potential migration of contamination within the pipeline bedding was assessed as slight adverse (not significant).<br>The remaining effects were assessed as Neutral (not significant).<br>During the decommissioning phase the impact on Controlled Groundwater from potential migration of contamination within the pipeline bedding was assessed as slight adverse (not significant). | Mitigation measures include completing earthworks in accordance with a Materials Management Plan (MMP) to ensure re-used material does not present a risk to human health or the environment. The MMP will provide a clear, consistent, and efficient process to enable the reuse of excavated material without it being classified as a waste and outline a cut / fill balance to reduce the amount of material permanently removed during the construction of the Proposed Development.<br>A surface water drainage strategy will be applied temporarily during construction to limit any contaminated run-off entering surrounding watercourses.<br>A Soil Management Plan (SMP) and Peat Management Plan (PMP) will also be prepared as part of the CEMP and implemented during construction.<br>The CEMP will also include best practice guidance measures to protect soils and prevent contamination of nearby waterbodies. | With mitigation measures in place, the only likely significant effect is predicted during construction due to the loss of approximately one hectare of high-quality agricultural land due to the introduction of the AGIs and BVSs.<br>No significant adverse effects are predicted to occur during operation or end-of-life decommissioning. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | A slight (beneficial) impact was identified for Agricultural Soils, due to the potential to restore agricultural land to its former quality and use.<br>The remaining effects were assessed as Neutral (not significant). | | |
| Landscape and Visual | The construction activities to build the DCO Proposed Development have potential to create temporary and permanent effects on landscape features through activities such as the clearance of vegetation and boundary features to enable space for new above ground assets.<br>Temporary, short-term effects on landscape character potentially would occur from the presence and movement of construction plant and associated temporary construction infrastructure.<br>During the operational phase, The Proposed Development will introduce new permanent above ground structures, primarily the AGIs and BVSs, that will affect the existing (and future) baseline landscape character of the Study Area. The assessment concluded that, at Operation Year 1, there will be no adverse effects of moderate or above, with the greatest effect noted to be minor adverse. Therefore, there are no significant effects on landscape character receptors anticipated.<br>During the decommissioning works it is anticipated that effects associated with the AGIs, BVSs and the Alltami Brook embedded pipe bridge option will be similar to those experienced during construction of the Proposed Development. Upon completion of decommissioning these will reduce to not significant. This is due to the landscape returning to the baseline situation or similar.<br>Receptors include nearby residents and recreational users of public footpaths in the vicinity of the Proposed Development. | Mitigation will include ensuring that the final design reduces the visual intrusion of construction working areas and loss of prominent vegetation.<br>Areas required only for construction will be restored once construction has ended and plans will be produced which set out the details, such as species and locations, of the landscape features to be replaced.<br>Visual impacts of the AGIs and BVSs during operation will be mitigated by each facility having a bespoke landscaping plan to screen views from receptors by planting new trees, shrubs, and hedgerows. A management plan will be prepared and implemented during the operational stage to ensure that the planting is well managed and maintained. | With mitigation measures in place, significant adverse effects during Construction are predicted on four landscape character areas, located near the River Dee, Flint, and Pentre Halkyn.<br><br>Significant effects are also predicted upon 28 visual receptors located across the route and include residential receptors of areas such as Mollington, Old Aston Hill and Saughall as well as users of some public footpaths, such as near Flint and the Shropshire Union Canal.<br><br>During operation, significant adverse effects are predicted on nine visual receptors during the first year of operation. Once the landscape planting has matured, no significant effects are likely to occur during operation.<br><br>During decommissioning, temporary significant adverse effects are predicted upon some Public Right of Ways (PRoWs), and the same receptors that would be |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | | | affected by the BVS, AGI and Alltami Brook embedded pipe bridge option Construction stage. However, once the decommissioning stage has completed, no significant residual effects are predicted. |
| Major Accidents and Disasters | The following Major Accidents and Disaster events have been identified which the DCO Proposed Development may be vulnerable to during the construction stage:<br>• Striking of underground services/utilities (fire and/or explosion or release of harmful gas);<br>• Damage of a third-party MAH pipeline (spillage of pollutants into ground or watercourse);<br>• Damage to slurry tank (land and water pollution accident);<br>• Release of methane gas (fire);<br>• Release of slurry resulting from decommissioning/demolition of the slurry tank (land and water pollution accident); and<br>• Presence of Centralised Compounds in the floodplain of the Tidal River Dee (water pollution accident).<br>The following Major Accidents and Disaster events have been identified to which the DCO Proposed Development may be vulnerable to during the operation and maintenance phase:<br>• Large scale release of $CO_2$ resulting from a loss of containment event involving an AGI and/or Carbon Dioxide Pipeline and/or block valve;<br>• Damage to AGI equipment which could potentially lead to a loss of containment of $CO_2$ for a limited period of time resulting from a fire and/or explosion at the Stanlow Manufacturing Complex or from an explosion at nearby industrial sites;<br>• Erosion of support below Carbon Dioxide Pipeline leading to pipeline failure resulting from flooding;<br>• Fire and/or explosion at fuel storage facility impacts the Rock Bank BVS resulting in a loss of containment event at the BVS and subsequent release of $CO_2$; and | Mitigation will include a programme of hazard studies to ensure that the design is safe and that residual risks are managed.<br><br>Environmental, health and safety management systems will also be implemented in accordance with COMAH Regulations 2015 and the pipelines Safety Regulations 1996.<br><br>Risk Management Systems will also be in place as required by health and safety legislative drivers. | With mitigation measures in place, the risks associated with all major accidents and disaster events will be managed to as low as reasonably practicable levels. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | • Large scale release of $CO_2$ resulting from a loss of containment event involving the Carbon Dioxide Pipeline.<br>These events could result in fire and/or explosion or release of harmful gas. This could cause $CO_2$ toxicity and fogging hazard which could affect neighbouring properties and/or people in the immediate area.<br>A collapse of mine/quarry workings could also damage the Carbon Dioxide Pipeline or BVS resulting in a loss of containment event. This could also cause $CO_2$ toxicity and fogging hazard which could affect neighbouring properties and/or people in the immediate area. | | |
| Materials and Waste | Using the baseline data for material resource availability in the North West of England and Wales, it can be asserted that there are currently no supply issues regarding the stock and supply of key construction materials. The impact of the Proposed Development on material resource consumption is considered to be slight adverse (not significant).<br>Forecasts of remaining landfill capacity in the North West of England and North Wales suggest that in the absence of future provision, landfill capacity at the completion of the construction stage will be very limited. However, the majority (99.8%) of waste and earthwork arisings are anticipated to be diverted from landfill. Therefore, the impact of the Proposed Development on waste landfill capacity is considered to be slight adverse (not significant).<br>The Proposed Development also passes through and close to several mineral safeguarding areas and therefore has the potential to sterilise these mineral sites by preventing future extraction of the resource. | Construction methods and activities will include measures for reducing waste. This includes, where soil is excavated to create the trenches, returning the soil once the pipe is laid where it is suitable to do so. Further mitigation during construction will include seeking to use recycled materials, diverting waste from landfill and ensuring that materials and waste are suitability stored and segregated on Site.<br><br>A MMP will be implemented in accordance with the CL:AIRE Definition of Waste: Code of Practice.<br>A Minerals Resource Assessment (MRA) has been prepared to support the ES. | With mitigation measures in place, no significant adverse materials and waste effects are predicted to occur during construction, operation, or end-of-life decommissioning. |
| Noise and Vibration | The majority of sensitive receptors are located near the areas of Sandycroft, Ewloe and Northop Hall although receptors are broadly present throughout the route of the Proposed Development.<br>During the construction phase, noise effects arising from the Proposed Development construction activities are likely to result in a medium or high adverse noise impact (significant) for nearby residential receptors.<br>For construction activities associated with the trenchless installation techniques some receptors are likely to experience a medium or high adverse noise impact. At the majority of crossings, this activity will occur occasionally and for a short period of time and would therefore be a not significant effect. However, there are six locations with longer crossings and difficult ground conditions | During construction, noise and vibration levels will be kept as low as practicable. Measures include temporary noise barriers, enclosures at specific locations and selection of quiet plant, where possible and practicable.<br><br>A Noise and Vibration Management Plan (NVMP) will be prepared before the start of construction works which will detail the specific mitigation measures to be implemented during construction. | With mitigation measures in place, 42 receptors are predicted to experience temporary significant noise effects during construction in the daytime period. Most receptors are located near Sealand and Sandycroft where the Proposed Development crosses the River Dee and Chester Road. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | where the duration of the evening and night-time working is expected to last up to four weeks. At these locations, the effect is considered to be significant.<br>Operational noise generated at the AGIs and BVSs will be limited and unlikely to result in significant effects.<br>Likely noise effects arising from the Proposed Development decommissioning activities are also anticipated to have a significant effect on nearby residential receptors. | As part of the NVMP trenchless installation activities during evening and night-time will require consideration of secondary mitigation including measures such as acoustic enclosures. Further information relating to mitigation measures will be contained within the detailed CEMP. | Sensitive receptors near trenchless crossing activities with difficult ground conditions may also experience significant noise effects during evening and night-time periods.<br><br>One receptor is predicted to experience significant noise effects during end-of-life decommissioning. No significant effects are predicted during operation. |
| Population and Human Health | There is the potential for temporary disruption to businesses and their employees as a result of potential minor access restrictions to roads whilst construction is undertaken. Associated construction traffic could also give rise to amenity effects for employees and customers. It is considered that this would likely result in a moderate adverse (significant) impact.<br>There is also potential during construction for temporary disruption to access to residential properties and community assets such as village halls, which may result in minor delays and potential loss in amenity for residents. It is considered that this would likely result in a moderate adverse (significant) impact. Where the disruption affects access for more vulnerable users i.e. accessing schools or nursing homes, it is considered that the effect would increase to large adverse (significant).<br>Construction of the Proposed Development will also cause temporary disruption to users of a number of PRoWs and to National Cycle Network Route 5. This could result in resulting in adverse mental health impacts from annoyance and nuisance.<br>There may also be a temporary loss in amenity value from construction work. It is considered that this would likely result in a moderate adverse (significant) impact for recreational users of the PRoWs and NCN Route 5.<br>During the operational phase, effects are anticipated on farming operations due to the permanent loss of agricultural land. Whilst this is not expected to prevent the functional operation of the | Mitigation during construction will include measures such as informing residents and community facilities nearby of planned works, locating working areas to reduce impacts on existing accesses, considerate timing of works and temporary route diversions with clear signage, amongst others.<br>A Construction Traffic Management Plan (CTMP) will be produced to manage impacts of construction traffic on local communities.<br>Financial compensation for the loss of agricultural land is proposed to mitigate impacts on local farmer's livelihoods. | With mitigation measures in place, some significant effects are predicted during construction. These include an adverse effect on users of two PRoWs due to temporary disruption. There are also anticipated to be adverse effects on access to several receptors including businesses and temporary loss of land.<br>No significant effects are predicted during operation. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | entire business owned and operated by the farmer, the impact is considered to be moderate adverse (significant). | | |
| Traffic and Transport | The following effects relating to traffic and transport during construction have been assessed and their impact on links that are sensitive to changes in traffic volumes have been calculated:<br>• Severance<br>~ Major Impact: 10 receptors<br>~ Moderate Impact: 10 Receptors<br>• Pedestrian Delay<br>~ Major Impact: 0 receptors<br>~ Moderate Impact: 21 Receptors<br>• Pedestrian Amenity<br>~ Major Impact: 2 receptors<br>~ Moderate Impact: 0 Receptors<br>• Fear and Intimidation<br>~ Major Impact: 10 receptors<br>~ Moderate Impact: 10 Receptors<br>• Driver Delay<br>~ Major Impact: 10 receptors<br>~ Moderate Impact: 10 Receptors<br>Major and Moderate Impacts are both considered to be significant. | An Outline Construction Traffic Management Plan (OCTMP) has been prepared and accompanies the ES. This document provides the framework of mitigation that will be refined and developed further by the contractor delivering the construction work.<br><br>An Interim Worker Travel Plan also accompanies the ES, which sets out a plan for how the construction workers' travel will be managed to reduce impacts on the road network. | With mitigation measures in place, no significant traffic and transport effects are predicted to occur during construction, operation or end-of-life decommissioning. |
| Water Environment and Flood Risk | During the construction phase, the following likely significant effects have been identified:<br>• Impacts to water quality and hydromorphology of watercourses from sediments.<br>• Impacts to water quality of watercourses by spillage of pollutants.<br>• Impact to hydrological and hydromorphological processes of watercourses from temporary crossings of watercourses for access.<br>• Impacts to hydrological and hydromorphological processes from open cut crossing of watercourses.<br>• Impacts to the groundwater levels and flows of groundwater receptors due to construction dewatering.<br>• Water quality impacts to groundwater receptors from pollution. | The following Environmental Management Plans will be produced to mitigate impacts on the water environment:<br>• Detailed CEMP.<br>• Detailed DEMP.<br>• Dewatering Management Plan (groundwater); and<br>• Groundwater Management and Monitoring Plan (GWMP).<br>Construction mitigation will include the use of trenchless crossings at some watercourses, such as the River Dee and the Shropshire Union Canal, which will avoid direct impacts. | With mitigation measures in place, significant effects are only predicted at Alltami Brook, near Northop Hall during the construction stage. This is because this watercourse will be crossed via an open cut trench method which will permanently impact the bedrock and the natural form of the watercourse. No other likely significant effects are predicted to occur during |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | • Flood risk impacts to residents and users of the surrounding land, as a consequence of potential changes in the surface and groundwater regime caused by the construction works; and<br>• Flood risk impacts to Construction workers as a consequence of working in the floodplain, in proximity to blocked watercourses or in areas potentially affected by other forms of flooding.<br>During the operational phase, the following likely significant effects have been identified:<br>• Impacts associated with loss of riparian vegetation along watercourse.<br>• Impacts to hydromorphology of watercourses due to channel and bank reinstatement following open cut crossings;<br>• Impacts associated with the Newbuild Carbon Dioxide Pipeline buried beneath the River Gowy; and<br>• Impacts associated with installation of permanent artificial features within the channel of the Alltami Brook.<br>During the decommissioning phase, the following likely significant effects have been identified:<br>• Impacts to water quality and hydromorphology from sediments in the Dee Estuary Special Protection Area and Mersey Estuary Site of Special Scientific Interest; and<br>• Impacts to water quality by spillage of pollutants in the River Dee and Dee Estuary SPA and Mersey SSSI. | Where watercourses are to be crossed via open-cut trench method, mitigation will also be implemented to reduce impacts, such as keeping the construction works area as small as practicable and pumping the water across the trench to maintain flows.<br>Impacts from flooding during construction will be minimised by, wherever practicable, avoiding working and storing materials and equipment in areas of flood risk, as well as the construction contractors signing up to flood alerts from the Environment Agency and Natural Resources Wales.<br>Impacts during operation will be mitigated by the design of each AGI and BVS incorporating a surface water management system. This will ensure that any surface water collected on the Site is suitably controlled and discharged. | operation or end-of-life decommissioning. |
| Combined and Cumulative Effects | The Inter-Project Effects Assessment for the Construction stage assessed the potential for inter-project effects for the following topics:<br>• Biodiversity.<br>• Land and Soils.<br>• Cultural Heritage.<br>• Landscape and Visual.<br>• Materials and Waste.<br>• Noise and Vibration.<br>• Population and Human Health.<br>• Traffic and Transport; and<br>• Water Resources and Flood Risk. | The assessment has not identified the need for any additional mitigation requirements beyond that already stated. | No significant residual effects have been identified. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
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| | The overall inter-project effects for each of the environmental topics were appraised to be minor adverse, with the exception of cultural heritage, which was appraised as negligible.<br>The Inter-Project Effects Assessment for the Operation Stage assessed the potential for inter-project effects for the following topics:<br>• Climate Resilience.<br>• Landscape and Visual; and<br>• Water Resources and Flood Risk.<br>All effects for the Operation Stage were appraised to be either minor adverse or negligible (not significant). The majority of the effects were found to be negligible.<br>No significant inter-project effects are predicted to occur during construction, operation or end-of-life decommissioning.<br>The following common receptors were identified in the Construction stage as having the potential for inter-project effects:<br>• Residential receptors – negligible to minor adverse (not significant);<br>• Recreational areas and PRoW and their users – negligible (not significant); and<br>• Non-residential properties and their users – minor adverse (not significant).<br>No common receptors have been identified for the operation stage, so there will be no inter-project effects at this Stage.<br>The only common receptors identified in the decommissioning stage as having the potential for inter-project effects are residential receptors (residents and residential properties). These are anticipated to see minor adverse (not significant) inter-project effects for one section of the Proposed Development.<br>No significant inter-project effects are predicted to occur during construction, operation or end-of-life decommissioning. | | |

# 7. TRENCHLESS CROSSING OF THE RIVER DEE

## 7.1. COMPONENTS

7.1.1. A Marine License (Ref: CML2350) for the trenchless crossing of the River Dee was granted on the 25th April 2024.

7.1.2. The Marine Licence is required for the marine licensable activities associated with the circa 75m length bored section of the pipeline installed below the River Dee, between the Mean High Water Springs (MHWS) mark on each bank. These licensable activities relate only to those elements that will be carried out and installed below MHWS.

7.1.3. 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 assessed within the Environmental Report to support the Marine Licence application. This is because the anticipated environmental effects of the Proposed Development are intrinsically linked to these connected activities.

## 7.2. ROUTE OVERVIEW

7.2.1. The trenchless crossing of the River Dee by the newbuild carbon dioxide pipeline forms part of the larger HyNet Carbon Dioxide Pipeline, outlined in Section 6.

7.2.2. The crossing point is located at approximate grid reference SJ 34811 67106 and is shown in Figure 7-1.

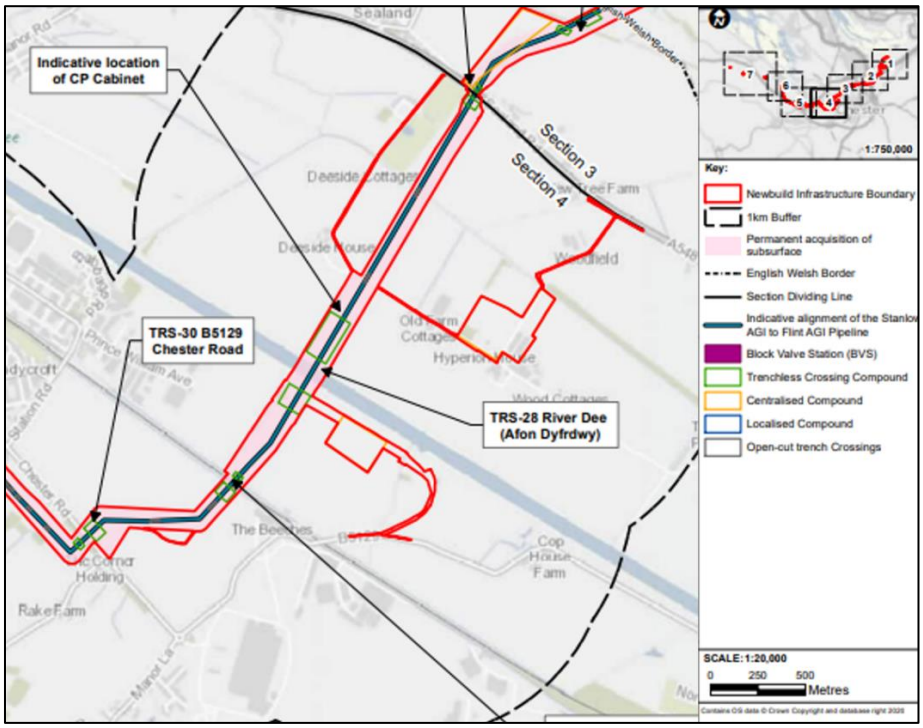


**Figure 7-2 – River Dee Crossing**

## 7.3. CONSTRUCTION

### TRENCHLESS CROSSING

7.3.1. 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 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.

7.3.2. 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.

7.3.3. Horizontal Directional Drilling (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.

7.3.4. 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; and
- Up to four weeks working for both micro-tunnelling and for HDD.

7.3.5. The HDD process starts by setting up the 'Rig Site' (entrance pit) and the 'Pipe Site' (exit pit). 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.

7.3.6. The micro-tunnelling process starts by setting up the Entrance Shaft site and the Exit Shaft site at each end of the tunnel. 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.

7.3.7. Both methods use 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.

**CONSTRUCTION COMPOUNDS**

7.3.8. 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.

**VEGETATION CLEARANCE**

7.3.9. 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.

**HYDROSTATIC TESTING**

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

7.3.11. 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.

7.3.12. 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.

7.3.13. Following hydrostatic testing, the water will be quality tested, then discharged to either a designated watercourse, public sewer via a temporary surface water pipe, or 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.

## 7.4. OPERATION AND MAINTENANCE

7.4.1. Carrying out a trenchless crossing under the River Dee will avoid a direct interface with the marine environment during operation.

7.4.2. The Proposed Development is permanent, but its useful life is linked to the capacity of the offshore reservoirs, where the $CO_2$ will be transported for permanent geological storage. The Proposed Development is designed to a life span of 25 years.

7.4.3. 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.

## 7.5. SUMMARY OF ENVIRONMENTAL EFFECTS AND PROJECT SPECIFIC MITIGATION

7.5.1. The following topics were scoped out of the assessment of environmental effects relating to the trenchless crossing of the River Dee:

- Air Quality;
- Climate Resilience;
- Cultural Heritage (Above Ground Designated Heritage Assets During Construction, Operation, Maintenance and Decommissioning Only);
- Biodiversity (Operation, Maintenance and Decommissioning Only;
- Greenhouse Gases;
- Land and Soils;
- Landscape and Visual;
- Major Accidents and Disasters;
- Materials and Waste;
- Noise and Vibration;
- Population and Human Health;
- Traffic and Transport; and
- Water Environment and Flood Risk.

7.5.2. These topics were scoped on the basis that there would be no likely significant effects.

7.5.3. Table 7-1 summarises the findings of the EIA process and the ES conclusions.

## Table 7-1 – HDD Pipeline Underneath the River Dee – Summary of Environmental Effects

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| Cultural Heritage | There is potential for slight adverse (not significant) effects on previously unrecorded buried heritage assets (archaeology) from the Proposed Development during the construction stage.<br>There is also potential for slight adverse (not significant) effects by the Proposed Development upon subsurface deposits such as peat. | Where appropriate the proposed work will comprise the following targeted activities:<br>• Geoarchaeological mitigation, comprising further boreholes and/or test pitting within the River Dee floodplain;<br>• Preservation in situ.<br>• Archaeological excavation.<br>• Archaeological strip, map, and sample; and<br>• Proportionate and appropriate post-excavation analysis and reporting. | There are no anticipated residual effects from the Proposed Development as should archaeology be present it will have been excavated and preserved by record. |
| Biodiversity | The crossing of the River Dee may require 24- hour working and may therefore require lighting at the location of the entrance/exit pits. Light spill onto the River Dee therefore has the potential to adversely impact 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 may also result in the disturbance of redshank, which may roost in the mudflat habitat along the river. It is therefore considered that in the absence of mitigation in relation to disturbance from lighting, there is potential for significant effects to occur.<br>Predicted noise levels from the trenchless installation techniques 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.<br>Finally, 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. | A CEMP will be produced and implemented throughout the Proposed Development and during all construction activities. The CEMP will include the following avoidance and mitigation measures designed to reduce harm to biodiversity receptors:<br>• Best practice measures to be followed during construction in relation to dust deposition.<br>• 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;<br>• Measures to avoid entrapment of otters in voids, trenches or pipes.<br>• Appropriate lighting design to avoid of reduce impacts of light spill around the River Dee on birds and fish;<br>• Where practical and reasonable, timings of works scheduled to avoid sensitive lifecycle stages (migration and spawning).<br>• Noise screening methods for works around the River Dee, if required, to reduce noise disturbance to qualifying bird species (namely redshank);<br>• NVMP including noise and vibration monitoring, utilisation of press or vibratory pile driving methods and soft-starts to pile driving to allow for fish dispersal; and<br>• Best practice measures to be followed during construction in relation to pollution prevention. | Following the implementation of the control measures identified, there would be no adverse effects on biodiversity from emissions or deposition of dust, noise and vibration, and disturbance from artificial lighting. |

# 8. PROTOS CARBON DIOXIDE SPUR PIPELINE

## 8.1. COMPONENTS

8.1.1. The Town and Country Planning Application (TCPA) planning application 24/00777/FUL was submitted to Cheshire West and Chester Council (CWCC) on the 13th March 2024, and is awaiting a decision. An EIA Screening Request was submitted to CWCC on 20 December 2023 (Ref: 23/04034/SCR). The Screening Opinion from CWCC concluded that the Proposed Development is not likely to have significant environmental effects and is therefore not an EIA development.

8.1.2. The Protos Spur Pipeline Proposed Development will connect to the Protos Carbon Capture Plant and other potential industrial emitters to transport the captured $CO_2$ to the Ince AGI. It will include the following:

- The Protos AGI will provide a transition point to connect the Protos Carbon Dioxide Spur Pipeline to the Protos Carbon Capture Plant. The AGI is specifically designed to operate and monitor the Protos Carbon Dioxide Spur Pipeline via continual remote monitoring and will comprise a fenced area measuring approximately 55m x 40m in size;
- The Protos Carbon Dioxide Spur Pipeline will be built out of steel and will measure circa 20" (50.8cm) in diameter and approximately 1.2km in length. It will comprise the following sections:
    - ~ The Protos AGI to West Central Drain - The pipeline will be above-ground for this section, routing west from the Protos AGI to a point immediately to the west of the West Central Drain, approximately 550m in length;
    - ~ West Central Drain South to Substation off Grinsome Road - From the west of the pipe bridge at the West Central Drain, the pipeline will transition to below ground for approximately 400m south for this section of the route, routing south to the substation; and
    - ~ After the substation off Grinsome Road, the Protos Carbon Dioxide Spur Pipeline will route east to Ince AGI. Within the section, the pipeline will continue below-ground for its entirety up to Ince AGI where it will connect to a tie-in point within the facility.

## 8.2. ROUTE OVERVIEW

8.2.1. The Protos Spur Pipeline Proposed Development is located approximately 500m northeast of Elton, along Marsh Lane. Figure 8-1 indicates the location of the application site:

**Figure 8-1 – Protos Carbon Dioxide Spur Pipeline Route**

8.2.2. The pipeline will cross the Protos Carbon Capture Plant and then pass through the Protos Energy Recovery Facility (ERF) within the Protos Resource Recovery Park, before routing south across Marsh Lane, and continuing towards Ince AGI, to the south of the site which is located outside of the Protos Resource Recovery Park.

## 8.3. CONSTRUCTION

8.3.1. The construction phase is anticipated to be approximately 16 months in duration, starting in June 2025.

8.3.2. A compound will be located near the below-ground section of the Protos Carbon Dioxide Spur Pipeline, and it will serve as point for accepting deliveries and storage of equipment, pipe and other material. From the compound, pipe sections and equipment will be transported directly to the storage areas within the Protos AGI and work fronts by appropriate transport.

## 8.4. OPERATION AND MAINTENANCE

8.4.1. The Protos Carbon Dioxide Spur Pipeline will have a 25-year design life. After this period, it is assumed that decommissioning of the Protos Spur Pipeline Proposed Development will take place.

## 8.5. SUMMARY OF ENVIRONMENTAL EFFECTS AND PROJECT SPECIFIC MITIGATION

8.5.1. As an EIA was not required for this development, there has been no formalised assessment of significant effects. The summary in Table 8-1 has been compiled based on the technical works undertaken to support the planning application.

## Table 8-1 – Protos Pipeline Spur – Summary of Environmental Effects

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| Air Quality | Construction stage<br>• A medium risk of dust soiling from earthworks has been identified for the Proposed Development. The risk to human health and ecological receptors from earthworks has been identified as low.<br>• A low risk from trackout on human health, ecological receptors and dust soiling has also been identified.<br>• Construction has been identified as having a low risk on dust soiling, and negligible risk on human health and ecological receptors.<br>Operational stage<br>Modelling of operational venting effects was undertaken and concluded that there was no risk of exceedance of the threshold set for protection of human health and a negligible impact on odours from venting operations. | The Protos Spur Pipeline Proposed Development is a medium risk site in relation to dust nuisance. Based on this level of risk, mitigation will be required. This will include:<br>• Communication measures such as a stakeholder communications plan, DMP and record of all dust and air quality complaints.<br>• Monitoring measures such as regular site inspections to monitor dust.<br>• Screening dusty activities and locating them as far away from receptors as possible.<br>• Management of earthworks and exposed areas or soil stockpiles to prevent windborne dust. Use of methods such as covering, seeding or using water suppression.<br>• Ensuring vehicles are switched off when not in use.<br>• Using water assisted dust sweepers and wheel washing facilities; and<br>• Ensuring vehicles are appropriately covered when entering and leaving the Site. | The residual effects of dust and PM10 generated by construction activities is considered to be negligible and not significant.<br>The residual effects of emissions to air from construction vehicles and plant on local air quality is considered to be negligible and not significant.<br>The residual effects of odours arising from venting activities at the Protos AGI will be negligible and not significant. |
| Cultural Heritage | The construction of the Protos Spur Pipeline Proposed Development would involve the partial removal of post-glacial to Late Bronze Age peat deposits, which have the potential to contain archaeological and palaeoenvironmental material from the prehistoric period.<br>There are no built heritage impacts anticipated as the settings of built heritage receptors within the study area (Elton Conservation Area and three listed buildings) do not extend to the Proposed Development. | Due to the previous disturbances and modern construction in the Proposed Development area it is unlikely that substantial archaeological remains survive. There may be potential impacts on remaining elements of the post-glacial to Late Bronze Age peat deposits, but it is not anticipated that these works can be safely monitored archaeologically, due to the depth and working width of the open cut trench area, and the required shoring of the trenches for safety purposes | Considering previous investigations undertaken as part of the HyNet Carbon Dioxide Pipeline DCO, no further archaeological works are required in that location. |
| Biodiversity | The Protos Spur Pipeline Proposed Development is considered to have a moderate adverse significant impact on the Mersey Estuary SPA, Ramsar and SSSI during construction, due to the risk of pollution via hydrological links and disturbance to protected species on functionally linked land. | A detailed CEMP and EMP will be produced. Industry best practice measures for pollution controls will be followed to prevent any pollution or degradation of habitats. Ecological enhancement opportunities will also be reflected within the detailed CEMP and could include installation of bat and bird nest boxes and creation of refugia from felled trees and vegetation clearance. | Following mitigation, no significant residual effects are anticipated as a result of construction, operation or decommissioning of |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| | It will also require both permanent and temporary land take from the Frodsham Helsby and Ince Marches LWS and nearby Habitats of Principal Importance (HPI) alongside a risk of pollution to habitats and disturbance of protected species. This could result in moderate adverse significant effects.<br>The effects on protected species during construction including badger, bats, breeding birds, otter, wintering birds, European eels and aquatic macroinvertebrates and macrophytes were all considered to be not significant. The effect on water voles was considered to be moderate adverse significant due to disturbance to watercourses with known populations of water vole.<br>Impacts on biodiversity associated with the operation and decommissioning stage were assessed as negligible and not significant. | An ECoW will be appointed to support, oversee and monitor implementation of measures outlined in the CEMP. This will include any pre-construction surveys for protected species required and delivery of toolbox talks to contractors.<br>Habitats will be retained where possible, and reinstated where temporary loss is unavoidable. Site clearance will be kept to a minimum as far as practicable. Vegetation and site clearance works will be undertaken outside the bird nesting period, recognised as March to August inclusive.<br>Protected species licenses will be required where impacts to protected species cannot be avoided. These will detail specific mitigation measures required to minimise disruption and mitigate impacts.<br>Lighting design, if required, will be in accordance with best practice guidance on lighting with regards to protected species.<br>A Biosecurity Method Statement will be implemented throughout the construction to control the spread of INNS.<br>A full list of mitigation measures is included within the EcIA. | the Protos Spur Pipeline Proposed Development. |
| Landscape and Visual | The landscape and visual appraisal considered the impact on nearby receptors such as residents and recreational users of PRoWs.<br>Further mitigation was identified as being required for recreational users along National Cycle Network Route 5 and Restricted byway 127 RB106/1 and RB107/1. | Existing scrub vegetation will be reinstated where it is lost to facilitate construction of the below ground pipeline.<br>Scrub vegetation will be planted along the southern and eastern boundaries of the Protos AGI.<br>The external fence will be painted in a similar green colour as the existing Ince Bio Power building so that it better fits the surrounding context. | Mitigation will be used to limit visual impacts on nearby receptors. |
| Noise and Vibration | During the construction phase, noise thresholds defined as Significantly Over Adverse Effect Levels would not be exceeded. Therefore, the construction noise effects will be not significant.<br>Construction traffic noise levels are likely to increase by no more than 0.3dB, which is classified as a negligible magnitude of impact. Therefore, the construction traffic noise effect would not be significant.<br>Operational noise predictions were assessed at the nearest noise-sensitive receptors on Orchard Park Lane and Ash Road. Results of the assessment indicate that operational rating noise levels will not exceed the | During the construction stage, Best Practicable Means will be followed, including:<br>• A nominated site contact will be provided for local residents to deal with complaints;<br>• Selection of quiet and low noise equipment and methodologies;<br>• Optimal location of acoustic screening to minimise noise adverse effects;<br>• Optimal location of equipment on site to minimise noise disturbance;<br>• The provision of acoustic enclosures around static plant, where necessary; and | Construction and operational noise effects from the proposed development have been assessed as not significant. |

| Receptor | Summary of Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| | existing background sound levels at the receptors. Therefore, the operational noise effect will not be significant. | • Use of less intrusive alarms, such as broadband vehicle reversing warnings, wherever possible. | |
| Traffic and Transport | No junctions are forecast to experience 30 or more two-way trips in either of the peak hours, even during the peak of construction traffic activity.<br>Across the extent of the construction traffic route, there are no significant patterns of locations of collisions and a very low accident rate, with only 4 collisions over five years. It is therefore unlikely that the Proposed Development would have a detrimental effect of road safety. | Embedded mitigation has been provided for the Protos Spur Pipeline Proposed Development by establishing construction traffic routes to the works locations which are suitable to accommodate HGVs and LGVs. The Proposed Development has also sought to maximise use of existing access locations.<br>Further mitigation measures are detailed in the OCTMP to further address any potential impacts arising from the construction phase. This includes routing construction traffic to avoid sensitive areas where practicable and avoiding unsuitable sections of the Local Road Network.<br>No specific mitigation is required with respect to junctions and road safety across the proposed development. | It is considered that, with the implementation of mitigation measures outlined within the OCTMP, that construction traffic associated with the Proposed Development could be accommodated without compromising the effective operation of the transport network within the Zone of Influence. |
| Water Environment and Flood Risk | Pollution and sediment loading from construction activities has the potential to lead to a degradation in water quality. This could adversely impact habitats and species within the watercourse.<br>The operation of the AGI will result in additional discharge to a watercourse. This could deteriorate the ecological conditions of the watercourse from increased sediment and pollutant loading of discharged runoff.<br>Noise and vibration from construction activities also have the potential to disturb fish within the water body.<br>Construction of the Proposed Development may also alter connectivity within the watercourse, which could impact populations of migratory fish. | Sediment management will be implemented during the construction phase following standard pollution prevention guidance and implemented via the CEMP. Water quality monitoring will also be undertaken.<br>Open cut crossings would have temporary diversions or be serviced with pumps to maintain longitudinal connectivity. Any impacts would be of short-term duration (i.e. approximately six weeks or less).<br>Trenchless crossing methods, if used, would act as a mitigation measure as they eliminate negative impacts upon the river corridor, the riverbed and banks and the riparian zone in comparison to trenched crossings.<br>Treatment measures such as filter drains, and vortex separators will be used to treat surface water prior to discharge into the watercourse. | The WFD screening and scoping stages of the assessment conclude that with the appropriate mitigation implemented, there are no residual risks at the water environment from the Proposed Development. |

# 9. RUNCORN CARBON DIOXIDE SPUR PIPELINE

## 9.1. COMPONENTS

9.1.1. An EIA Scoping Report was submitted to Cheshire West and Chester Council (CWCC) and Halton Borough Council (HBC) on 16th April 2024 in relation to the Runcorn Carbon Dioxide Spur Pipeline. Since the Spur Pipeline will cross two local authority's boundaries it is important that the Scoping Report was submitted to both parties for review.

9.1.2. The Runcorn Spur Pipeline Proposed Development will comprise:

- The Runcorn AGI, which will be situated adjacent to the Viridor EfW Facility Carbon Capture Plant, Runcorn, Cheshire;
- The Runcorn Carbon Dioxide Spur Pipeline, which will run from Runcorn AGI to Ince AGI;
- Additional equipment at Ince AGI; and
- Temporary construction compound(s) and temporary accesses.

9.1.3. The Proposed Development will transport $CO_2$ captured from the Viridor Energy from Waste (EfW) Facility Carbon Capture Plant located in Runcorn, Cheshire to Ince AGI, and the $CO_2$ will then be transported for storage in depleted oil and gas fields in Liverpool Bay via the consented HyNet Carbon Dioxide Pipeline (a Development Consent Order granted on 20 March 2024). The Proposed Development does not include infrastructure to capture and store $CO_2$ emission.

## 9.2. ROUTE OVERVIEW

9.2.1. The Proposed Development will be located between Ince and Runcorn and will be built out of steel and will measure 20" in diameter and approximately 10km in length. There are three sections that make up the Runcorn Spur Proposed Development, these include:

- Runcorn AGI to the River Weaver- For this section, the pipeline will be above-ground on steel supports, routing west from the Runcorn AGI, then southwest to the Weaver Navigation Canal. The pipeline then follows the Canal southbound following a pre-existing network of above ground pipe infrastructure. The pipeline will transition to below-ground at a point on the north side of the Canal to facilitate the crossing of the Canal and River Weaver. This section is entirely within HBC's local authority boundary.
- Weaver Navigation and River Weaver Crossing (the "Weaver Crossing")- The Weaver Navigation and River Weaver will be crossed via a below ground pipeline at a point on the north of the

Weaver Navigation Canal, south to the Frodsham Marshes. Technical feasibility, environmental features in the area and consultation with key stakeholders will determine the crossing point and the associated construction methods. However, at this stage it is assumed that this will be facilitated via trenchless crossing techniques and several crossing points are currently being considered. The Red Line Boundary is intentionally wide in this location to allow for several crossing locations to be further assessed prior to determining a preferred option. This section crosses both HBC and CWCC local authority boundaries.

- Weaver Crossing to Ince AGI- This section of pipeline will remain below-ground routing south of the River Weaver and continuing in a south westerly direction to the north of the M56. The route will then continue west passing south of the existing CF Fertilisers plant on its approach to meet Ince AGI. The pipeline will be installed primarily by open trenching through this entire section, with trenchless crossings used in select locations where necessary to facilitate crossing obstructions. This section is entirely within CWCC local authority boundary.

## 9.3. CONSTRUCTION

9.3.1. The construction stage is anticipated to be approximately 23 months in duration from mid-2026 to early 2028.

9.3.2. Core working hours will run from 08.00 to 18.00 on weekdays (excluding bank holidays) and from 08.00 to 13.00 on Saturdays. 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.

9.3.3. Core working hours may vary at locations where pipeline construction works are required to be undertaken from the Weaver Navigation Canal, and during the trenchless installation of the Weaver Crossing. In such cases, continual 24-hour working will be required to allow the activities to be completed as safely and quickly as possible.

### CONSTRUCTION COMPOUNDS

9.3.4. The exact location of the construction compound(s) is to be confirmed. However, construction compound(s) will be located along the route which will be accommodated within the Red Line Boundary. It is assumed they

will be micro-sited to reduce the proximity to residential properties, to minimise visibility and to avoid key landscape features.

9.3.5. Temporary compounds will be established before commencement of the main construction works for the storage of pipe, materials, plant and equipment. The fenced compounds will include staff welfare facilities, waste storage, and wheel washing areas.

9.3.6. The temporary compounds will include hardstanding areas, with apron and haul road areas comprising stone laid on a geotextile membrane. The construction compounds may require lighting to ensure safety and security, especially in the winter months.

9.3.7. Temporary access tracks will be provided to link the pipeline construction areas to the local road network where required. The access tracks will be fenced and gated to aid control of vehicle access to and exit from the construction areas from the local road network.

9.3.8. The size of the construction compound(s) is yet to be determined.

**PIPELINE CONSTRUCTION**

9.3.9. Most of the above-ground section of the pipeline is proposed to be installed on new steel pipe supports on shallow-pad concrete foundations. New pipe bridges will be installed to cross existing roads and watercourses in various locations. The pipeline will be routed on existing pipe-racks and supports only where these are assessed as suitable for repurposing.

9.3.10. Construction of the above-ground pipeline will be achieved by a combination of land-based and water-based vehicles. Given the restricted land access for the proposed routing along the western boundary of the INEOS site and along the Weaver Navigation Canal, the intent is to use the canal to transport some of the pipe segments and carry out construction activities. This will facilitate construction in parts of the pipeline route which are not easily accessible from land.

9.3.11. The construction methodology for the below-ground section of the Runcorn Carbon Dioxide Spur Pipeline is to be confirmed by the Construction Contractor (post planning determination) but will involve a combination of both open-trenched installation and trenchless crossings.

9.3.12. The pipeline will be installed at a minimum depth of 1.2m from surface to crown of pipe. The depth will be greater in locations, dependent on topography and existing features, amongst other factors. Open cut trenches will be typically 2m deep but could be up to 6m deep to enable pipeline installation.

## 9.4. DECOMMISSIONING

9.4.1. The Design Life for the operational elements of the Runcorn Spur Pipeline Proposed Development is assumed to be a maximum of 25 years, at which point the permanent operational infrastructure will be decommissioned. This will include decommissioning of the surface infrastructure, including decontamination and removal of any hazardous materials, the dismantling and clearance of infrastructure including free standing and supported process equipment, piping, buildings, pipe bridges and steel framed structures.

9.4.2. It is anticipated that the underground Runcorn Carbon Dioxide Pipeline will be filled with nitrogen and left in situ in the ground. The above ground facilities associated with the AGI and pipeline will be decommissioned and preserved in line with industry best practice and facility owner requirements at the time of decommissioning.

9.4.3. Decommissioning will consider all the environmental legislation and the technology available at the time. Any necessary consents, licences or permits will be acquired.

## 9.5. SUMMARY OF ENVIRONMENTAL EFFECTS AND PROJECT SPECIFIC MITIGATION

9.5.1. The ES to support the TCPA for the Proposed Development is currently being prepared and therefore is not available to feed into this Combined NTS. The summary in Table 9-1 is therefore based on the Scoping Report submitted to CWCC and HDC. As a result, the likely significant effects, mitigation and conclusions outlined below are preliminary, and further information will be available within the final ES, when complete. An assessment of cumulative effects has also not been included within the Scoping Report and will be included within the ES.

## Table 9-1 — Runcorn Spur Pipeline Proposed Development Summary of Environmental Effects

| Receptor | Summary of Likely Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| Air Quality | Sensitive receptors have been identified with the Scoping Report in relation to Air Quality including human health, residential properties and ecological sites surrounding the site.<br><br>The construction and decommissioning phases may cause dust and PM10 from construction/ decommissioning works which could result in effects on the sensitive receptors, which may be significant.<br>During the operational phase, venting of gas from the AGI may take place causing a release of $CO_2$ and Hydrogen Sulphate (H2S) causing odours, which may be significant. | Project specific mitigation will be determined within the ES however, the following embedded measures are likely to be implemented during the construction phase.<br>• CEMP;<br>• DMP;<br>• Regular site inspections, where receptors are nearby, to monitor dust, record inspection results and make an inspection log available to the Local Authority when requested;<br>• Plan the Site layout so that machinery and dust causing activities are located away from receptors, as far as possible; and<br>• Where reasonably practical avoid the use of diesel- or- petrol- powered generators.<br>Once the Site is operational, an Odour Management Plan may be implemented. | Post mitigation, it is considered that the construction and decommissioning activities will not result in significant effects. However, this will be confirmed following further assessment as part of the ES. Further modelling of odours as a result of venting activities will also be required to determine the significant of any resulting effects. |
| Climate Resilience | Sensitive receptors have been identified during the construction, operation and decommissioning phase for Climate Resilience. Such receptors include the construction/ decommissioning, site workers, materials, plant and equipment, $CO_2$ pipeline and AGI. This is due to these receptors having medium or high vulnerability to the climate change factors such as drought, extreme precipitation events and extreme wind events. | An Outline Environmental Management Plan (EMP) will be produced and developed into a CEMP.<br>Embedded mitigation measures will also be included within the design. During the operational phase, embedded mitigation will be used to protect the Site from climate change including flooding and heavy winds, overheating. Such measures include:<br>• Ensuring compounds have sufficient drainage;<br>• Use of a Heating, Ventilation, and Air Conditioning (HVAC) system to ensure electrical equipment does not overheat; and<br>• All equipment will be climate resilient. | Further assessments are required to determine the effects on Climate Resilience, and these will be reported within the ES. |
| Cultural Heritage | During the construction stage, any activities that require ground disturbance, such as preliminary ground works, topsoil removal for easement corridor, pipe trench excavation, diversion of existing | Mitigation strategies will be developed following further desk-based research and archaeological evaluation across the Runcorn Spur Pipeline | Further assessments are required to determine the effects |

| Receptor | Summary of Likely Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| | utilities and establishment of laydown areas and temporary works compounds, could impact on known or previously unrecorded heritage assets and paleoenvironmental deposits. Any impacts will be permanent and irreversible, potentially resulting in significant effects, depending on the value of the heritage asset impacted.<br>There is a potential for impacts on historic landscapes during the construction stage, due to the change in landscape character. However, any impacts on historic landscapes due to the Runcorn Spur Pipeline Proposed Development are anticipated to be temporary as the land will be returned to its original use after the construction stage.<br>No significant effects are anticipated from the operational phase on either the setting of heritage assets or on below ground heritage assets.<br>No significant effects are anticipated during decommissioning of the Runcorn Spur Pipeline Proposed Development as any direct physical impacts to archaeological remains experienced during the construction stage are permanent. While there is potential for temporary change to setting during the decommissioning, these are not anticipated to be significant. | Proposed Development. The results of the assessment will determine if any mitigation measures will be required to protect, or record designated and non-designated heritage assets. This may include protection measures, archaeological excavation, or strip, map, and record to ensure the recording of any heritage assets physically affected by the Runcorn Spur Pipeline Proposed Development. No specific mitigation measures have currently been adopted. Any archaeological mitigation will be agreed with the local planning authority's archaeological advisors. | on Cultural Heritage and these will be reported within the ES. |
| Biodiversity | A range of receptors/ resources will be scoped into the ES as there could be significant impacts to these during different phases of the development. These effects include direct physical impacts (e.g. loss of habitat or harm to protected species) and indirect impacts (e.g. pollution events and disturbance). Receptors which may be affected include:<br>• Statutory Designated Sites International;<br>• Non- Statutory Designated Sites;<br>• Priority Habitats;<br>• Watercourses and Waterbodies;<br>• Badger;<br>• Bats;<br>• Otter;<br>• Water Vole;<br>• Other Mammals;<br>• Birds;<br>• Amphibians;<br>• Reptiles;<br>• Terrestrial Invertebrates; | The embedded mitigation measures for Biodiversity will be outlined within an OCEMP. Other embedded mitigation measures will include:<br>• 10% BNG will be incorporated within the design of the Proposed Development;<br>• Avoidance of habitat loss by minimising land take for construction;<br>• Trenchless crossings to avoid damage to the River Weaver and Weaver Navigation Canal; and<br>• Following relevant legislation and engaging with stakeholders to avoid highly sensitive areas, where practicable. | Further assessments are required to determine the effects on Biodiversity and associated mitigation, and these will be reported within the ES. |

| Receptor | Summary of Likely Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| | • Fish;<br>• Aquatic MacroInvertebrates;<br>• Macrophytes;<br>• Invasive non-native species; and<br>• Trees.<br>With the exception of the Runcorn AGI, the Runcorn Spur Pipeline Proposed Development is likely to result in mainly short-term and temporary impacts to facilitate construction.<br>The majority of receptors will be subject to effects during the construction stage. Operational effects are likely to be limited to AGI locations. Decommissioning of the Pipeline after 25 years is anticipated to consist of the underground sections of the pipeline being retained underground (no excavation) and filling with nitrogen. The above ground facilities associated with the AGI and pipeline will be decommissioned and preserved in line with industry best practice and facility owner requirements at the time of decommissioning. | | |
| Greenhouse Gases | The magnitude of emissions associated with the Runcorn Spur Pipeline Proposed Development cannot be quantified until during the EIA, and as such the impact of the Runcorn Spur Pipeline Proposed Development on GHG emissions is not currently known. However, professional judgement has led to the following aspects being scoped into the ES.<br>• Product stage;<br>• Transport of material to site;<br>• Plant and equipment use during construction;<br>• Transport of waste;<br>• Land use, land use change and forestry;<br>• Venting;<br>• Fugitive gas emissions; and<br>• Avoided emissions.<br>The ES will detail the environmental effects in further detail. | Some mitigation measures to reduce GHG emissions associated with the design and construction phase of the Proposed Development include:<br>• Design optimization to reflect the carbon hierarchy;<br>• Maximise the use of sustainable materials;<br>• Implementation of a CEMP;<br>• Implementation of a Site Waste Management Plan (SWMP); and<br>• Use of high-performance machinery. | Further assessments are required to determine the effects on GHG and associated mitigation and these will be reported within the ES. |
| Land and Soils | During construction, operation and decommissioning there are likely significant effects associated with Land and Soils.<br>Those scoped into the ES include:<br>• Agricultural Land - Potential loss to BMV Land;<br>• Human Health - Contamination links to human health;<br>• Controlled waters - Contamination links to controlled waters; and<br>• Ground Stability - Areas of unstable ground including peat. | The embedded mitigation measures applicable to Land and Soils are standard good practices and will minimise exposure risks for the duration of the construction stage.<br>These measures are likely to form part of a standard CEMP, which will be produced for the Runcorn Spur Pipeline Proposed Development. | Further assessments are required to determine the effects on Land and Soils and associated mitigation, and these will be reported within the ES. |

| Receptor | Summary of Likely Environmental Effects | Project Specific Mitigation | Conclusion |
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| | Mineral resources - sand and gravel have been scoped out of the assessment as no potential significant effects have been associated with this receptor. | | |
| Landscape and Visual Amenity | Potential environmental effects have been identified associated with the Landscape and Visual Amenity of the Proposed Development. Changes to the local landscape character within the Red Line Boundary and study area (e.g. clearance of vegetation and built features) are considered as being likely significant effects. Changes to the visual amenity due to the presence of construction plant and infrastructure is also regarded as likely to have significant effects. Many receptors/ resources have been scoped out of the assessment including changes to the national landscape within the Red Line Boundary and study area, receptors beyond 2km of the Red Line Boundary and assessment of night-time effects from lighting. Further to this, changes to the existing landscape character and visual amenity associated with the Conservation Areas at Elton, Frodsham, Overton, Weston Village and Frodsham Registered Park and Garden have also been scoped out. | Embedded mitigation will be in place to protect the Landscape and Visual Amenity of the Proposed Development and surrounding areas. Measures during construction include but are not limited to:<br>• Protection of RPA's outside of the Red Line Boundary;<br>• Kiosks, fences and lighting columns within the AGI will be painted to a colour that fits the context in which they are located;<br>• Where reasonably practicable, woodland including Ancient Woodland has been excluded from the Runcorn Spur Pipeline Proposed Development. Where practicable, areas of woodland and trees within the Proposed Development will be retained and exclusion buffers clearly demarcated.<br>Operational embedded mitigation:<br>• Management will take place to ensure all mitigation planting thrives and survives; and<br>• Land disturbed to make way for construction that isn't then used as part of the Runcorn Spur Pipeline Proposed Development during operation will be reinstated and returned to existing land uses following completion of the construction stage.<br>Decommissioning measures include:<br>• Appropriate protections to the established vegetation will be provided to ensure damage is avoided during the removal of apparatus. Where damage is unavoidable, replacement of any lost or damaged planting that was provided during the | Further assessments are required to determine the effects on Landscape and Visual Amenity and associated mitigation, and these will be reported within the ES. |

| Receptor | Summary of Likely Environmental Effects | Project Specific Mitigation | Conclusion |
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| | | operational stage or any pre-existing, or newly planted by others, will be provided in agreement with the relevant LPA; and<br>• Best practice and compliance with legislation will be followed. | |
| Major Accidents and Disasters | Based on professional judgement, major accidents and/or disasters are events or situations that have the potential to affect the Runcorn Spur Pipeline Proposed Development causing immediate or delayed serious damage to one or more of the following: human health, welfare, and the environment.<br>The receptors that are considered sensitive include:<br>• Members of the public and local communities;<br>• Infrastructure and the built environment;<br>• The natural environment, including ecosystems, land and soil quality, air quality, surface and groundwater resources and landscape;<br>• The historic environment, including archaeology and built heritage; and<br>• The interaction between the factors above.<br>Further to this, major events including technological or manmade hazards have been scoped into the assessment. Utilities failure, pollution accidents, transport accidents industrial and urban accidents are the main major event categories associated with these major events. | Embedded mitigation measures for Major Accidents and Disasters include:<br>• Good engineering practice;<br>• Designing in accordance with the requirements of the Pipelines Safety Regulations 1996;<br>• Environmental, Health & Safety Management systems;<br>• Supplier management environmental, health & safety standards (e.g. Construction Skills Certification Scheme);<br>• Risk management systems; and<br>• An OCEMP. | Further assessments are required to determine the effects on Major Accidents and Disasters and associated mitigation, and these will be reported within the ES. |
| Materials and Waste | The sensitive receptors associated with Materials and Waste are material resources and landfill void capacity.<br>The Proposed Development is not expected to materially impact available resources. Therefore, no significant effects are anticipated during construction.<br>During operation materials will only be required for routine maintenance and repair works and therefore only minimal quantities will be required.<br>During decommissioning, the requirement for materials resources will be negligible as no construction will be required. The quantity of waste generated will be minimal and will be diverted from landfill where feasible. Decommissioning impacts are therefore considered to be not significant for both materials resource consumption and waste generation and disposal. | Embedded mitigation measures include implementation of a CEMP and Construction Waste Management Plan (CWMP).<br>The waste storage areas will be segregated and stored sufficiently.<br>Backfilling of earthworks and trenchless installation techniques will also be utilised. | As no significant effects have been identified with Materials and Waste, this will be scoped out of the ES. A response from Halton Borough Council outlined that they agree with the subjects scoped into the assessment. |

| Receptor | Summary of Likely Environmental Effects | Project Specific Mitigation | Conclusion |
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| | As no significant effects have been identified with Materials and Waste, this will be scoped out of the ES. | | |
| Noise and Vibration | The environmental effects associated with the construction phase that are considered significant include:<br>• Noise and vibration from the construction activities associated with trenchless crossings such as HDD, where applicable;<br>• Noise and vibration from the construction activities associated with vegetation removal, excavation and soil backfilling;<br>• Noise and vibration from the construction activities associated with the Runcorn AGI;<br>• Noise and vibration from the construction activities associated with construction compounds; and<br>• Noise and vibration from the construction activities associated with heavy vehicle movements.<br>Any potential noise and vibration effects arising from the construction stage of the Runcorn Spur Pipeline Proposed Development will be of temporary nature for the duration of the construction stage.<br>The likely significant effects associated with the Operation Stage will potentially relate to noise associated with the operation of the Runcorn AGI.<br>It is anticipated that any potential noise effects arising from the Operation Stage of the Runcorn Spur Pipeline Proposed Development will be of long-term nature until decommissioning.<br>Any potential noise and vibration effects arising from the Decommissioning Stage of the Runcorn Spur Pipeline Proposed Development will be of temporary nature for the duration of the Decommissioning Stage. | Best Practicable Measures will be included within the embedded mitigation measures to reduce noise effects during construction.<br>During Operation, if required measures such as acoustically designed enclosures or screening within the AGI. However, based on professional experience of similar projects, including the operational noise assessment undertaken for HyNet Carbon Dioxide Pipeline DCO, this is unlikely to be required. | Further assessments are required to determine the effects on Noise and Vibration and associated mitigation, and these will be reported within the ES. |
| Population and Human Health | The Scoping Report has identified that during the construction phase, private property and housing and businesses and their employees and customers may have significant effects. Effects result from disruption of access and changes in visual amenity, increases in noise and vibration and decrease in air quality.<br>Users of PRoW may also experience significant effects during construction due to temporary diversions and closures of routes.<br>During the operational phase and decommissioning phase no likely significant effects have been identified. | Embedded mitigation measures to be implemented into the Proposed Development relating to Population and Human Health include a CTMP.<br>Land disturbed to make way for construction that isn't then used as part of the Runcorn Spur Pipeline Proposed Development during operation will be reinstated and returned to existing land | Further assessments are required to determine the effects on Population and Human Health and associated mitigation, and these will be reported within the ES. |

| Receptor | Summary of Likely Environmental Effects | Project Specific Mitigation | Conclusion |
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| | | uses following completion of the construction stage.<br>Where possible, PRoW will remain accessible.<br>Where this is not practicable, suitable temporary diversions will be put in place and clearly signposted.<br>Further specific mitigation measures will be included within the ES if required. | |
| Traffic and Transport | During the construction phase, the following effects are considered as having the potential for significant effects, resulting from changes to traffic composition and flow through increased construction traffic:<br>• Severance, Driver;<br>• Delay, Pedestrian;<br>• Delay, Pedestrian;<br>• Amenity, Fear and Intimidation; and<br>• Highway Safety.<br>The Scoping Report has identified no likely significant effects for the operation and decommissioning phase. | The Proposed Development will consider, from the outset, the most appropriate roads that can be used as construction traffic routes.<br>An OCTMP will accompany the planning application, which will include measures to mitigate against potential traffic and transport effects. | Further assessments are required to determine the effects on Traffic and Transport and associated mitigation, and these will be reported within the ES. |
| Water Resources and Flood Risk | A number of receptors have been scoped into the ES as potential significant effects resulting from potential for direct and indirect physical impacts have been identified. These significant effects are predicted through all three stages of the Proposed Development (construction, operation and decommissioning).<br>The receptor/ resources include:<br>• Main rivers, ordinary watercourses and ponds;<br>• Groundwater receptors;<br>• Flood risk receptors; and<br>• WFD receptors. | The embedded mitigation measures in place to reduce effects from Water Resources and Flooding include:<br>• Production of a CEMP and DEMP;<br>• Production of a Sediment Management Plan;<br>• Production of a GWMP; and<br>• Production of a FRA.<br>Best practice construction methods will also be used to limit the risk of pollution to sensitive receptors, including use of sediment barriers for works within 10m of a watercourse.<br>Measures will also be in place to minimise flood risk, such as locating material storage areas or compounds outside floodplains where possible. | Further assessments are required to determine the effects on Water Resources and associated mitigation, and these will be reported within the ES. |

# 10. PADESWOOD CARBON DIOXIDE SPUR PIPELINE

## 10.1. COMPONENTS

10.1.1. A request for an EIA Scoping Opinion was submitted to Flintshire County Council on 28th March 2024, and a response was received on the 8th June 2024. An Environmental Statement is currently being prepared for submission to FCC.

10.1.2. The Padeswood Spur Pipeline will connect Heidelberg Materials UK Cement Plant, located at Padeswood, Flintshire to Northop Hall AGI, forming part of the HyNet project. It will include the following components:

- The Padeswood AGI will provide a transition point to connect the Padeswood Carbon Capture and Storage (CCS) site (Heidelberg Materials Padeswood Cement Works Carbon Capture and Storage) and the Padeswood Spur Pipeline. The Padeswood AGI will be specifically designed to operate and monitor the Padeswood Spur Pipeline via continual remote monitoring and will comprise a fenced area measuring approximately 50m x 40m in size;
- The Padeswood Carbon Dioxide Spur Pipeline will be built out of steel and will measure 16" in diameter and approximately 10km in length. The Padeswood Carbon Dioxide Spur Pipeline will be installed entirely below ground, other than where it will surface to connect to the AGIs at Padeswood and Northop Hall.
- Additional equipment at Northop Hall AGI, including a include a PIG receiving facility; and
- Temporary construction compound(s).

## 10.2. ROUTE OVERVIEW

10.2.1. The Padeswood Carbon Dioxide Spur Pipeline shown in Figure 10-1, will run from Padeswood AGI (located at Padeswood CCS) northwest through Flintshire County to the Mold Bypass (A494) between Mold and Mynydd Isa. The route will then head north following the A494, before crossing under the A494 and continuing North, and under the A55, to connect into Northop Hall AGI.

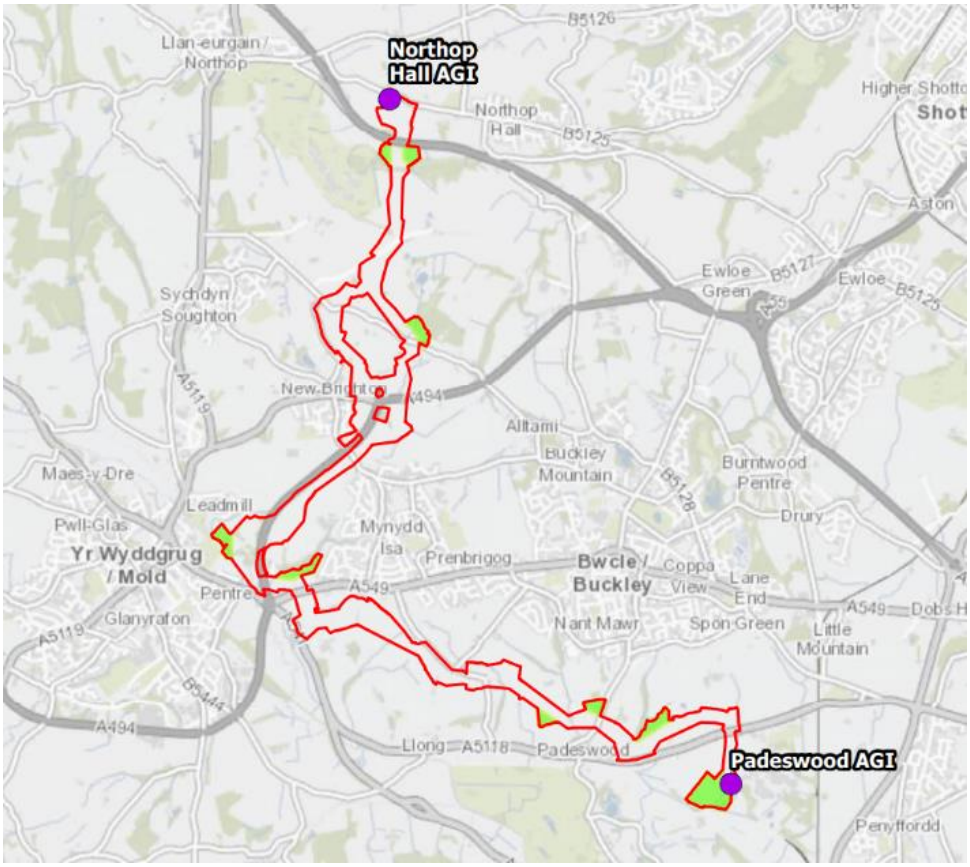


**Figure 10-3 – Padeswood Carbon Dioxide Spur Pipeline Route**

## 10.3. CONSTRUCTION

10.3.1. The construction stage is anticipated to be approximately 16 months in duration from 2026 to early 2028.

### CONSTRUCTION COMPOUNDS

10.3.2. The exact location of the construction compound(s) is to be confirmed. However, construction compound(s) will be located along the route which will be accommodated within the Red Line Boundary. It is assumed they will be micro-sited to reduce the proximity to residential properties, to minimise visibility and avoid key landscape features.

10.3.3. Temporary compounds will be established before commencement of the main construction works for the storage of pipe, materials, plant and equipment. The fenced compounds will include staff welfare facilities, waste storage, and wheel washing areas.

### PADESWOOD AGI CONSTRUCTION

10.3.4. The construction stage of the AGI is expected to involve the following activities:

- The area will be stoned up to a level surface, with tarmac roads to give a suitable surface for construction traffic (consented and delivered under the Padeswood Cement Works Carbon Capture Plant application); and
- Set-up of local compound to serve AGI construction. This will include required laydown and storage areas, as well as construction facilities, including offices, storage containers, construction plant parking, welfare, and toilets.
- The AGI will be approximately 50m x 40m.The construction methodology for the Padeswood Carbon Dioxide Spur Pipeline will involve a combination of both open-trenched installation and trenchless crossings.

**PIPELINE CONSTRUCTION**

10.3.5. The construction methodology for the Padeswood Carbon Dioxide Spur Pipeline will involve a combination of both open-trenched installation and trenchless crossings.

10.3.6. The pipeline will typically be installed to a depth of 1.2m from surface to crown of pipe. The depth will be greater in locations, dependent on topography and existing features, amongst other factors.

10.3.7. Open-trenched construction works will generally be contained within a fenced construction corridor, termed the Working Width. This will be kept as narrow as possible but will be a maximum width of 25m.

10.3.8. Trenchless installation techniques will be required at certain locations to avoid disruption to utilities, major highways, watercourses, and particular environmental features. These techniques use a machine to drill or 'bore' a hole through the ground from one side of a specific feature 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.

10.3.9. There are various trenchless installation techniques available that will be confirmed by the Construction Contractor. Horizontal Directional Drilling (HDD), Auger Boring (Guided (GAB) and Unguided (UAB)) and Micro-Tunnelling are three types of trenchless installation techniques that are most likely to be utilised.

## 10.4. OPERATION AND MAINTENANCE

10.4.1. The design life for the operational elements of the Padeswood Spur Pipeline Proposed Development is assumed to be a maximum of 25 years, at which point the permanent operational infrastructure will be

decommissioned. This will include decommissioning of the surface infrastructure. It is anticipated that the underground Padeswood Spur Pipeline will be filled with nitrogen and left in situ in the ground.

## 10.5. SUMMARY OF ENVIRONMENTAL EFFECTS AND PROJECT SPECIFIC MITIGATION

10.5.1. The ES to support the TCPA for the Proposed Development is currently being prepared and therefore is not available to feed into this Combined NTS. The summary in Table 10-1 is therefore based on the Scoping Report submitted to FCC. As a result, the likely significant effects, mitigation and conclusions outlined below are preliminary, and further information will be available within the final ES, when complete. An assessment of cumulative effects has also not been included within the Scoping Report and will be included within the ES.

## Table 10-1 – Padeswood Pipeline Spur – Summary of Environmental Effects

| Receptor | Summary of Likely Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| Air Quality | There is potential for temporary significant effects from dust on human health, dust soiling and ecological sites during the construction and decommissioning phases.<br>There is also potential for significant effects from emissions from construction plant.<br>During operation, there is potential for significant effects from odours resulting from venting operations at the AGIs. | The following mitigation measures are likely to be implemented as part of the construction of the Padeswood Spur Pipeline alongside utilising best practice measures, contained within a CEMP:<br>• Develop and implement a DMP (set out within the CEMP);<br>• Carry out regular site inspections where receptors are nearby, to monitor dust, record inspection results, and make an inspection log available to the Local Authority when asked;<br>• Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible; and<br>• Where reasonably practicable avoid the use of diesel- or petrol-powered generators, for example by using hybrid site generators.<br>During the operational phase, an Odour Management Plan will be implemented. | It is anticipated that with mitigation, the effects from dust and emissions from construction plant will not be significant.<br>Further assessment is required to understand the duration and level of impact from venting operations at the AGI. |
| Climate Resilience | There is potential for the pipeline and AGI to be impacted by ground movement and stability from drought. There is also potential for the AGI to be impacted by flooding and high winds damaging infrastructure, and through lightning strikes which can cause fires, as well as power surges and shock waves which can destabilise energy systems, and cause damage to electronic and ICT equipment.<br>There is also the potential for the decommissioning site and workers to be impacted by flooding, heatwaves, storms, and high winds, which can damage equipment, cease works, and pose health and safety risks.<br>Effects associated with the construction site and construction workers have been scoped out of further assessment due to low vulnerability. | An Outline EMP will be prepared as part of the planning application for the Padeswood Spur Pipeline Proposed Development. This will be developed into a detailed CEMP, which will be prepared by the Construction Contractor. The Outline EMP contains the environmental controls, environmental protection measures and safety procedures that will be adopted during the construction stage including:<br>• Ensuring construction compound drainage has sufficient capacity to cope with the volume of heavy rainfall events;<br>• Making pumps available to remove water from any excavation works.<br>• Ensuring welfare facilities are cooled. Provide adequate rest, shade and PPE for workforce during periods of high temperature and high solar radiation;<br>• Monitoring of weather conditions and forecasts to identify extreme weather Events; and | Receptors deemed as having a medium or high vulnerability to climate change will be assessed further within the ES to determine any significant environmental effects and associated mitigation. |

| Receptor | Summary of Likely Environmental Effects | Project Specific Mitigation | Conclusion |
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| | | • Being flexible in terms of adjusting the programme of work activities or scheduling daily working time to account for extreme weather conditions.<br>For the operational phase, the following embedded mitigation measures have been assumed:<br>• All equipment at the Padeswood AGI will be elevated on concrete foundations/plinths at a suitable height to mitigate flood risk;<br>• Above ground equipment will be specified with a high quality external coating to protect from external corrosive mechanisms;<br>• The AGI drainage will be designed to meet the needs of future base cases for flooding and extreme rainfall events;<br>• All other main critical infrastructure will be buried and/or built of suitable resistant material to impacts from precipitation;<br>• The E&I Kiosk within the Padeswood AGI will have an HVAC system to ensure the electrical equipment within does not overheat;<br>• There will be an Operations and Maintenance Procedure for routine maintenance and inspection visits on the Padeswood AGI. | |
| Cultural Heritage | During construction, any activities that require ground disturbance could impact on known or possible below ground heritage assets and paleoenvironmental deposits. Any impacts will be permanent and irreversible, potentially resulting in significant effects, depending on the value of the heritage asset impacted.<br>There is a potential for impacts on historic landscapes (including hedgerows) during the construction stage, due to the change in landscape character. However, these impacts are anticipated to be temporary as the land will be returned to its original use after construction.<br>No significant effects are anticipated on the setting of heritage assets during operation of the Padeswood Spur Pipeline as it will be below ground and not visible from | Mitigation strategies will be developed following further desk-based research and archaeological evaluation across the Padeswood Spur Pipeline Proposed Development. The results of the assessment will determine if any mitigation measures will be required to protect, or record designated and non-designated historic assets. This may include protection measures, archaeological excavation, or strip, map, and record to ensure the recording of any historic assets physically affected by the Padeswood Spur Pipeline Proposed Development. | Further assessment will be required within the ES to determine the significance of any impacts to below ground heritage assets during construction and associated mitigation. |

| Receptor | Summary of Likely Environmental Effects | Project Specific Mitigation | Conclusion |
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| | the surface. No significant effects have also been identified for the Northop Hall AGI.<br>No significant effects are anticipated on below-ground heritage assets in the operational and decommissioning stages as the impacts will occur in the construction stage. | | |
| Biodiversity | During construction and decommissioning, the following receptors have been identified as having potential for significant effects relating to habitat loss and degradation:<br>• Designated Sites (RAMSAR, SPA, SSSI etc);<br>• Non-Statutory Designated Sites (Wildlife Sites);<br>• Priority Habitats;<br>• Ancient Wood; and<br>• Watercourses and waterbodies.<br>Potential for operational phase impacts to Designated Sites have also been identified.<br>Impacts to the following protected species have also been identified, resulting from habitat loss and risk of harm during all phases of the Proposed Development:<br>• Badger;<br>• Bats;<br>• Otter;<br>• Other Mammals;<br>• Birds; and<br>• Fish.<br>Potential impacts due to habitat loss and degradation and risk of harm on the following species have only been identified during construction and decommissioning:<br>• Hazel Dormouse;<br>• Great Crested Newts;<br>• Reptiles;<br>• Aquatic Macroinvertebrates;<br>• Macrophytes;<br>• Terrestrial Invertebrates; and<br>• INNS. | Measures to avoid or minimise adverse effects on ecological features will continue to be incorporated iteratively into the emerging design of the Padeswood Spur Pipeline Proposed Development. These include:<br>• Minimising land take for construction and optioneering for compound locations to reduce habitat loss;<br>• Use of trenchless construction techniques to avoid damage to key habitats such as watercourses; and<br>• Implementation of a CEMP. | The Padeswood Spur Pipeline Proposed Development is likely to result in mainly short-term and temporary impacts to facilitate construction. Operational effects are likely to be limited to AGI locations.<br>The majority of receptors will be subject to effects during the construction Stage.<br>Further assessment will be required within the ES to determine the significance of any impacts to biodiversity and associated mitigation. |

| Receptor | Summary of Likely Environmental Effects | Project Specific Mitigation | Conclusion |
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| Greenhouse Gases | The magnitude of emissions associated with the Padeswood Spur Pipeline Proposed Development cannot be quantified until during the EIA, and as such the impact of the Padeswood Spur Pipeline Proposed Development on GHG emissions is not currently known. | The magnitude of GHG emissions associated with the design and construction stage of the Padeswood Spur Pipeline Proposed Development can be minimised by taking into account the following measures:<br>• Design optimisation to reflect the carbon reduction hierarchy;<br>• Specifying in procurement documentation that materials and products with reduced embodied carbon emissions are preferred;<br>• Designing, specifying and constructing the Padeswood Spur Pipeline Proposed Development with a view of maximising the operational lifespan and minimising the need for maintenance and refurbishment;<br>• Implementing a CEMP, incorporating a Site SWMP and MMP by the Construction Contractor;<br>• Specifying efficient mechanical and electrical equipment such as lighting and telecommunications that are long-lasting and based on its durability and energy efficiency credentials; and<br>• Using locally sourced materials where available and practicable to minimise the distance materials are transported from source to site. | Further assessment will be required within the ES to determine the significance of effects from greenhouse gases and associated mitigation. |
| Land and Soils | There is potential for significant effects during the construction stage of the development resulting from loss of areas of Grade 3a (BMV) agricultural land.<br>There is also a risk of significant effects to human health and controlled waters during construction from contaminated land.<br>Finally, there is a risk of significant effects during construction and operation associated with ground stability. | It is anticipated that the following mitigation measures are likely to be considered within the environmental assessment:<br>• Implementation of a MMP when managing re-use of surplus soils to ensure material does not present a risk to human health or the environment and complies with UK waste regulations;<br>• Development of soil management plan(s) to mitigate impacts to the condition of agricultural land;<br>• Appropriate measures to limit contamination to the ground from construction related plant/machinery and storage of materials; and | Further assessment will be required within the ES to determine the significance of effects relating to land and soils and associated mitigation. |

| Receptor | Summary of Likely Environmental Effects | Project Specific Mitigation | Conclusion |
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| | | • Use of Best Practice Mitigation Measures to be detailed within an EMP. | |
| Landscape and Visual Amenity | The following landscape and visual amenity effects are considered potentially significant, resulting from removal of existing vegetation and built features:<br>• Changes to landscape character within the Red Line Boundary and study area due to construction activities; and<br>• Changes to existing visual amenity of surrounding sensitive receptors due to construction activities.<br>The following landscape and visual amenity effects are considered potentially significant, resulting from introducing new permanent structures associated with the Padeswood AGI:<br>• Changes to landscape character within the Red Line Boundary and study area during operation due to new built form, use of new infrastructure, and landscaping; and<br>• Changes in existing visual amenity of surrounding sensitive receptors during operation due to new built form and landscaping. | The following embedded mitigation measures have been included within the Proposed Development:<br>• Minimise extent of hedgerow removal and tree loss and protection of Root Protection Areas (RPAs);<br>• Kiosks, fences and lighting columns within the AGIs will be painted to a colour that fits the context in which they are located;<br>• Consideration of construction methods such as trenchless crossings to minimise impacts to PRoWs and cycle routes;<br>• Where loss of hedgerow, tree or woodland is unavoidable and takes place as a result of construction works, the loss will be replaced with like-for like species, as close as is practical to their original locations;<br>• Land disturbed to make way for construction that is not then used during operation will be reinstated and returned to existing land uses following completion of the construction stage;<br>• During the operational stage, management will take place to ensure all mitigation planting thrives and survives; and<br>• During decommissioning, appropriate protections to the established vegetation will be provided to ensure damage is avoided during the removal of apparatus. | Further assessment will be required within the ES to determine the significance of effects relating to landscape and visual amenity and associated mitigation. |
| Major Accidents and Disasters | The following MA&D types have been identified as having potential vulnerability relating to the Proposed Development:<br>• Industrial and urban accidents – mines and storage caverns (construction and operation Stage) due to potential for ground stability issues resulting from legacy mining in the region; | The Proposed Development will be constructed and managed in accordance with the following:<br>• Good engineering practice;<br>• Designing in accordance with the requirements of the Pipelines Safety Regulations 1996;<br>• Environmental, Health & Safety Management systems;<br>• Supplier management environmental, health & safety standards (e.g. Construction Skills Certification Scheme); | The MA&D types identified will be further assessed within the ES to identify any significant effects and associated mitigation. |

| Receptor | Summary of Likely Environmental Effects | Project Specific Mitigation | Conclusion |
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| | • Industrial and urban accidents – fires (operation stage) due to proximity to the Padeswood Cement Works;<br>• Pollution accidents – air (operation stage) resulting from significant loss of $CO_2$ containment;<br>• Utilities failure – electricity (construction stage) due to presence of electrical infrastructure within the Red Line Boundary; and<br>• Utilities failure – gas (construction stage) due to presence of gas infrastructure within the Red Line Boundary. | • Risk management systems; and<br>• An OCEMP. | |
| Materials and Waste | Given the scale of the Padeswood Spur Pipeline, (one AGI facility and approximately 10km of 16" pipeline) the Proposed Development is not expected to materially impact available resources. As such, no significant effects are anticipated during construction.<br>During operation materials will only be required for routine maintenance and repair works and therefore only minimal quantities will be required.<br>Measures are in place to manage site arisings and waste generated during construction and operation. As such, with the implementation of a waste management plan, it is considered that impacts on remaining landfill capacity will be negligible and therefore not significant.<br>During decommissioning, the requirement for materials resources will be negligible as no construction will be required. The decommissioning phase will adhere to similar principals as for the construction phase, and therefore the quantity of waste generated will be minimal (derived from the AGI only) and will be diverted from landfill where feasible. Decommissioning impacts are therefore considered to be not significant for both materials resource consumption and waste generation and disposal. | Embedded mitigation which will be in place for the Proposed Development includes:<br>• Application of circular economy principles by the Construction Contractor implemented in the detailed CEMP;<br>• Development of a Construction Waste Management Plan, which identifies waste storage areas and segregation measures;<br>• Use of trenchless installation techniques to allow above ground infrastructure to remain in-situ and intact; and<br>• Backfilling of trenching activities to minimise the requirement for imported materials. | As no significant effects relating to materials and waste are anticipated, this has been scoped out of the EIA, and this was accepted by FCC. |
| Noise and Vibration | The likely significant effects associated with the construction stage of the Proposed Development will potentially relate to: | Opportunities for mitigation during the construction stage of the Padeswood Spur Pipeline Proposed Development are likely to include Best Practicable Means (BPM), examples of which are presented below: | Further assessment will be required within the ES to determine the |

| Receptor | Summary of Likely Environmental Effects | Project Specific Mitigation | Conclusion |
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| | • Noise and vibration from the construction activities associated with trenchless crossings, such as HDD;<br>• Noise and vibration from the construction activities associated with vegetation removal, excavation and soil backfilling;<br>• Noise and vibration from the construction activities associated with the AGI;<br>• Noise and vibration from the construction activities associated with construction compounds; and<br>• Noise and vibration from the construction activities associated with heavy vehicle movements.<br>The likely significant effects associated with the operation stage will potentially relate to noise associated with the operation of the AGI.<br>Decommissioning activities for the Padeswood Spur Pipeline have the potential to adversely affect nearby noise and vibration sensitive receptors. This will include decommissioning activities associated with the removal of the AGI. | • Prior consent agreement for any works outside core hours, where there is potential for significant adverse effects;<br>• Nominated site contact for local residents to deal with complaints and engaging with local residents;<br>• Selection of quiet and low noise equipment and methodologies;<br>• Optimal location of acoustic screening to minimise noise adverse effects, where practicable;<br>• Optimal location of equipment on site to minimise noise disturbance;<br>• The provision of acoustic enclosures around static plant, where practicable; and<br>• Use of less intrusive alarms, such as broadband vehicle reversing warnings.<br>Opportunities for mitigation during the operational stage of the project are likely to include acoustically designed enclosures or screening within the AGI and increasing the distance to noise sensitive receptors. | significance of effects relating to noise and vibration and associated mitigation measures. |
| Population and Human Health | The following potential significant effects on population and human health have been identified:<br>• There is potential for access to community and recreational facilities to be temporarily affected by increases in construction traffic;<br>• There is potential for access to housing to be temporarily affected by increases construction traffic;<br>• The construction of the Padeswood Spur Pipeline will likely result in the temporary and permanent loss of agricultural land, which could impact on the viability of agricultural businesses that rely upon this land;<br>• There are a significant number of PRoWs located within the Red Line Boundary and the wider study area. Some of these routes may | Relevant design and mitigation measures will be identified in the ES, and these may include:<br>• Ensuring that routes used by walkers, cyclists and horse riders, including PRoWs, will remain open where practicable and accessible to users during the construction stage. Where this is not practicable, suitable and clearly signposted diversions will be identified or temporary closures will be put in place;<br>• Notifying local residents and other stakeholders, ensuring they are aware of the commencement of construction works; and<br>• Maintaining access to businesses and farms throughout the construction period.<br>Embedded mitigation measures includes development of a Construction Traffic Management Plan and | Further assessment will be required within the ES to determine the significance of effects relating to population and human health and associated mitigation requirements. |

| Receptor | Summary of Likely Environmental Effects | Project Specific Mitigation | Conclusion |
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| | require temporary diversions and closures during construction; and<br>• There is potential for a direct adverse effect on human health from increases in noise and air pollution, nuisance, restrictions in access to facilities and recreation (including PRoWs) and loss of visual amenity. This may have differing effects on the vulnerable populations located across the study area. | reinstatement of land disturbed during construction, where not used. | |
| Traffic and Transport | There is potential for temporary effects due to increases in traffic flow and changes to traffic composition (i.e. increased proportion of HGVs) through Construction.<br>The effects relating to traffic and transport, may be significant, and are detailed below.<br>• Severance;<br>• Driver Delay;<br>• Pedestrian Delay;<br>• Pedestrian Amenity;<br>• Fear and Intimidation; and<br>• Highway Safety.<br>Effects during the Operation and Decommissioning Stages are considered to be not significant. | The Padeswood Spur Pipeline Proposed Development will consider, from the outset, the most appropriate roads that can be used as construction traffic routes, which will be selected based on their proximity to the strategic road network, distance from the proposed temporary access points, capacity of route and the character of the route.<br>An Outline CTMP will accompany the planning application, which will include measures to mitigate against potential traffic and transport effects | Further assessment will be required within the ES to determine the significance of effects relating to traffic and transport and any associated mitgation. |
| Water Resources and Flood Risk | The following potential significant effects relating to water resources and flood risk have been identified:<br>• Direct and indirect physical impacts on main rivers, ordinary watercourses, ponds and lakes during construction, operation and decommissioning;<br>• Pollution risk from spillages, material storage and increased turbidity on groundwater during construction;<br>• Temporary dewatering during construction and long-term underground structures and reinstated ground during operation and decommissioning has the potential to affect the groundwater levels and flows;<br>• Dewatering during construction may impact levels and flows at springs and Ground Water | Mitigation measures which will be included within the Proposed Development are outlined below:<br>• A CEMP will be implemented to mitigate environmental impacts, and will include a Groundwater Management Plan;<br>• For trenched crossings, the hydrological regime will be maintained through temporary diversion or pumping. A sediment management plan and the provision of adequate buffer zones and silt fencing between construction activities and the watercourses will control sediments and pollutants reaching watercourses. Watercourses will be reinstated at the end of the Construction and decommissioning stage;<br>• Storage of materials or site compounds will not be located within the active fluvial and tidal | Further assessment will be required within the ES to determine the significance of effects relating to water resources and flood risk and associated mitigation. |

| Receptor | Summary of Likely Environmental Effects | Project Specific Mitigation | Conclusion |
|---|---|---|---|
| | Dependent Terrestrial Ecosystems within the study area;<br>• Potential for increase to flood risk on nearby residents and users of the surrounding land as a result of the Proposed Development within a floodplain;<br>• Below ground structures (pipeline/ piles/foundations) have the potential to create a groundwater flow barrier resulting in groundwater level rise and potentially increasing the risk of groundwater flooding to residents and users of the surrounding land and construction and maintenance workers; and<br>• Potential risk to construction workers and operators/maintainers due to works within the floodplain and near watercourses. | floodplains. Construction material will be controlled near watercourses;<br>• A Flood Consequence Assessment will be undertaken for the proposed permanent works (operational stage) outlining all mitigation measures to prevent the risk of flood risk to the Padeswood Spur Pipeline Proposed Development and prevent the increase in flood risk elsewhere; and<br>• A surface water drainage report will also be prepared demonstrating the detailed drainage design for the Padeswood AGI. | |

# 11. HYNET NORTH WEST HYDROGEN PIPELINE

## 11.1. COMPONENTS

11.1.1. A Preliminary Environmental Information Report (PEIR) was submitted by Wood Group UK Limited in September 2022 for the HyNet North West Hydrogen Pipeline proposed DCO project.

11.1.2. The HyNet North West Hydrogen Pipeline comprises the construction, operation and maintenance of up to 125km of new pipeline to distribute hydrogen to industry. It also includes potential blending points with the existing gas network in the North West, and a number of Hydrogen Above Ground Installations (HAGIs) required to control the flow and pressure of hydrogen at key points along the proposed pipeline. The key proposed components are summarised below.

11.1.3. The Hydrogen Pipeline Network (HPN) across the North West region includes:

- West Corridor: Stanlow Hydrogen Production Plant (HPP) to Central Hub HAGI, incorporating Rocksavage HAGI (two routeing options currently under consideration around the Hover Force Outdoor Activity Centre, and two options south-east of the Rocksavage HAGI); spurs to customers at Intergen, Rocksavage; and The Heath Industrial and Business Park via Runcorn HAGI (two routeing options currently under consideration).
- North Corridor: Central Hub HAGI to St Helens HAGI, incorporating HAGIs at Higher Walton and Clock Face; spurs to customers at Solvay, Warrington and Ingevity, Warrington (shared single connection); Novelis, Warrington; NGF Europe Ltd., Clock Face; NSG Pilkington Greengate Works, St Helens; and Glass Futures, St Helens.
- East Corridor: Central Hub HAGI to Partington HAGI, incorporating a HAGI at Warburton and Block Valve near Sworton Heath (three options currently under consideration); spurs to Cadent AGI, Warbuton; and customers at SAICA, Partington; Partington Cadent AGI; Basell Polyolefins, Partington; and Carrington Power Station, Carrington.
- South Corridor: Central Hub HAGI to Hydrogen Storage Facility at salt caverns located north of Middlewich (four routeing options currently under consideration), incorporating a Block Valve (BV) (five options currently under consideration); spur to Tata Chemicals, Winnington.

11.1.4. The key components of this project include:

- Construction, operation and maintenance of up to 125km of new pipelines to distribute hydrogen to industry and power stations and opportunities for blending with the existing natural gas network in the North West;
- Four main Pipeline Corridors connected at a Central Hub;
- Ten HAGIs along the pipeline to control the flow and pressure of hydrogen at key points along the proposed pipeline;
- Two Block Valves (BVs) along the pipeline (BVs are an underground valve which can rapidly stem the flow of the $CO_2$ stream); and
- Smaller pipelines known as spurs branching off each pipeline corridor, to connect identified customers for the hydrogen.

## 11.2. ROUTE OVERVIEW

11.2.1. Within the preferred Strategic Option A, route corridors were then developed. These followed the direct line routes between connection points where possible, with spur lines identified where needed to make the actual connections.

11.2.2. Four Pipeline Corridors (West, North, East and South) each connecting to the Central Hub HAGI were developed and can be seen on Figure 11-1.

11.2.3. The route corridor boundaries avoid or minimise impacts on items such as built-up areas or identified environmental or construction constraints, such that a pipeline within that route corridor could feasibly be consented and developed. Each route corridor was considered in more detail with the boundaries refined where possible to further improve the construction viability and minimise any potential impacts.

11.2.4. The pipeline would be buried along the entire route apart from short sections within secure compounds at locations where HAGIs and BVs are required.

11.2.5. There will also be various spurs branching off the four Pipeline Corridors and these are proposed to run through: Runcorn/ Rocksavage, Clock Face, Warrington, St Helens, Warburton, Partington and Northwich.

11.2.6. HAGIs will also be located at certain points along the pipeline route. These will consist of permanent above ground components.

11.2.7. Then HAGIs will be located within the Corridors and are proposed within HPP, Rocksavage, Runcorn, Central Hub, Higher Walton, Clock Face, St Helens, Warburton, Partington and HSF.

11.2.8. Further to this, pressure reduction units, metering facilities, inspection facilities, instrumentation and control kiosks, BVS, cathodic protection and marker posts will be located along the Corridor.

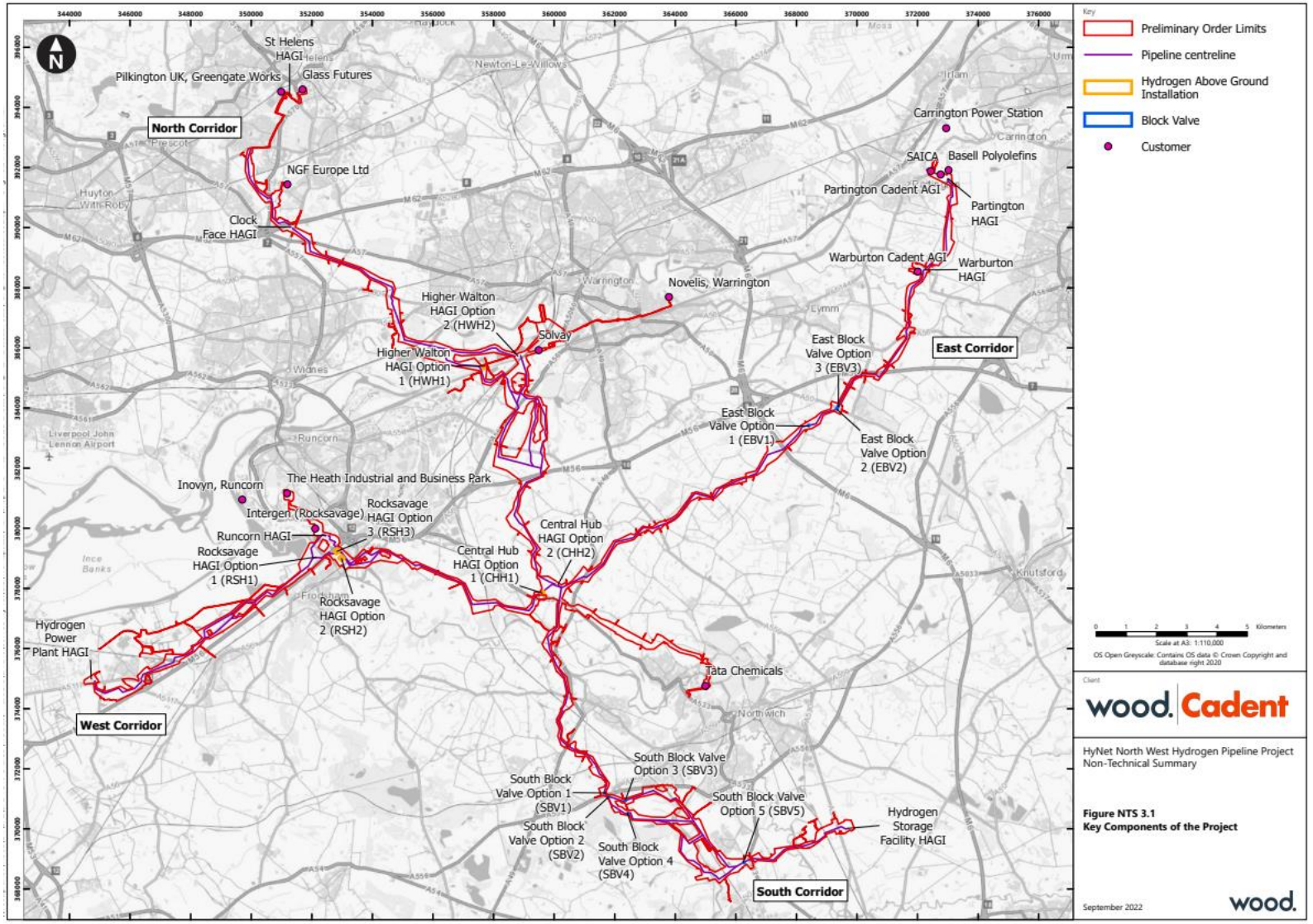



**Figure 11-1 Hydrogen Pipeline Corridors**

## 11.3. CONSTRUCTION

11.3.1. Site preparation works would include the installation of site fencing, PRoW crossing points, access track creation, site clearance and minor earthworks.

11.3.2. The pipeline would predominantly be constructed using an open cut installation technique which involves the excavation of a trench and the installation of the pipeline in the trench. The key parts to the installation include trench excavation, de-watering (if required), testing and commissioning.

11.3.3. The working width of construction along the pipeline will vary along the route depending on the constraints, the diameter of the pipeline being installed, and the method of installation.

11.3.4. Following the installation of believe me I moved to hydrogen part

11.3.5. the pipeline, the working area would be reinstated by re-establishing previous land uses where possible, landscaping and drainage works.

11.3.6. Some trenchless construction would be required where the pipeline crosses features such as rivers, major roads and railways. Several different trenchless crossing techniques may be used, including HDD, auger boring, micro-tunnelling, and direct pipe. Trenchless techniques install the pipeline beneath the barrier (e.g. major road or river) without disturbing the surface. The choice of technique adopted would be determined with consideration of third-party needs, ground conditions and the length and depth of the crossing.

11.3.7. The construction of a HAGI would require mechanical equipment, pipelines, electrics, Instrumental and Control Kiosks, Pressure Reduction Units, metering facilities and inspection facilities to be installed. Construction of BVs would follow a similar procedure.

11.3.8. Temporary construction compounds would be established to support the construction of the pipeline, HAGIs and BVs. The construction Site for a HAGI would typically include the necessary temporary construction compound to be co-located for maximum convenience.

11.3.9. Smaller temporary compounds would also be established at BV locations to enable construction of these installations. Once the pipeline has been constructed and reinstated, the temporary construction compounds would be removed, and land reinstated to its former condition.

11.3.10. The construction of the Project is expected to start in late 2024 and be fully operational in late 2027 or early 2028.

## 11.4. OPERATION AND MAINTENANCE

11.4.1. The HAGIs will be operational 24 hours a day and will be monitored and operated remotely. There will be periodic maintenance of the HAGIs during their lifetime and will consist of frequent and infrequent procedures.

11.4.2. The pipeline would be subject to aerial surveys by helicopter, drone and/or vantage surveys so access onto private land is not normally required. Aerial surveys are typically undertaken every two weeks, but frequency will be determined during further design development and engagement with the Health and Safety Executive. Access to private land along the pipeline may be required infrequently (every 2-7 years) for closer inspection of the pipeline and for maintenance.

## 11.5. DECOMISSIONING

11.5.1. The design life of the Project infrastructure is 40 years, but the actual life of the Pipeline could extend over 40 years depending on its ongoing condition that would be monitored, as over time parts are likely to be maintained or upgraded.

11.5.2. Once the use of the pipelines ceases, it would be left in situ and filled in sections to avoid any environmental effects associated with removal. The HAGIs and BVs would be removed, with materials being reused or recycled where possible or disposed of in accordance with relevant waste disposal requirements. Land would then be restored to its former use.

## 11.6. SUMMARY OF ENVIRONMENTAL EFFECTS AND PROJECT SPECIFIC MITIGATION

11.6.1. As the Proposed Development is at an early stage of the DCO process, a detailed assessment of environmental effects has not been undertaken. A PEIR has been produced which provides an overview of the project and sets out any potential environmental, social and economic effects, alongside initial mitigation measures. The PEIR does not constitute a full EIA and further assessments will therefore take place and be accounted for in the final ES. This will then confirm any specific mitigation measures, likely significant effects, and residual effects. Table 11-1 summarises the findings of the PEIR.

## Table 11-1 – Hydrogen Pipeline – Summary of Anticipated Environmental Effects

| Receptor | Summary of Likely Environmental Effects | Anticipated Project Specific Mitigation (Subject to Change Once Assessment Complete) | Anticipated Conclusion |
|---|---|---|---|
| Biodiversity | The PEIR has identified negative effects on some ecological features however there will be no significant effects to biodiversity.<br>During the construction phase, some of the negative effects include:<br>• Permanent or temporary land take/ land use change resulting in habitat loss or degradation;<br>• Fragmentation of habitats resulting in a reduction in connectivity;<br>• Increased noise, vibration, light and movement levels resulting in disturbance to foraging, commuting bats;<br>• Changes in air quality resulting in damage to habitats and/or species through excessive dust; and<br>• Pollution events resulting in damage to habitats and/or species through pollution (terrestrial and aquatic).<br>Throughout the operational phase, some of the negative effects include:<br>• Increased noise, vibration and lighting resulting in disturbance to foraging, commuting, resting species, and/or disturbance to resting places; and<br>• Permanent or temporary land take/land use change and fragmentation of habitats resulting in potential habitat loss or degradation, potential loss/damage to resting places, potential to kill/injure species, and/or affect distribution. | Embedded mitigation measures will be implemented as part of the Proposed Development, these measures include:<br>• Biodiversity Net Gain (BNG) (enhancement) and an outline Biodiversity Mitigation Strategy (BMS);<br>• Minimising land take and micro-siting of above ground features;<br>• A Code of Construction Practice (CoCP) including construction traffic speed limits and sensitive access and enabling works;<br>• Sensitive vegetation removal and habitat reinstatement;<br>• Maintaining habitat connectivity and protection of retained habitats;<br>• Protection of ancient/ veteran trees and use of RPZ;<br>• Management of invasive species;<br>• Method statement and Tool Box talks to be prepared for specific matters;<br>• The Project will join a Natural England-led great crested newt DLL scheme, in districts where it is currently available;<br>• Where possible, vegetation clearance would be timed to avoid nesting bird season (that is March – August inclusive), otherwise nesting bird checks would be undertaken by a suitably qualified ecologist and avoidance of active nests may be necessary;<br>• A general ecological method statement would outline ecological good practice measures including pre-construction update surveys;<br>• Pollution prevention control measures including noise control and protection of watercourses, would be detailed in a method statement;<br>• Measures to address impacts from lighting and sensitive lighting design would be | Within the PEIR, it is stated that with successful implementation of the embedded mitigation measures would minimise the risk of any likely significant effects. However, following further assessments, this will be confirmed within the final ES. Further environmental measures may be defined depending on the results of the surveys. |

| Receptor | Summary of Likely Environmental Effects | Anticipated Project Specific Mitigation (Subject to Change Once Assessment Complete) | Anticipated Conclusion |
|---|---|---|---|
| | | considered in accordance with best practice guidance and would be included within the CoCP..<br>Further biodiversity specific mitigation measures will be detailed in the ES if required. | |
| Historic Environment | The PEIR has identified negative significant effects on some features during the construction and operational phases due to disturbance of the ground and working close to historic buildings and landscapes.<br>These significant effects are related to:<br>• Disturbance of buried remains of prehistoric mortuary monuments;<br>• Disturbance of archaeological remains through compaction;<br>• Disturbance of artefacts and ecofacts within peat layers;<br>• Disturbance of archaeological remains through compaction;<br>• Disturbance of associated archaeological remains;<br>• Dewatering of waterlogged remains; and<br>• Dewatering of waterlogged remains and loss of water contributing to its sensitivity. | To reduce any potential significant or negative effects, embedded mitigation measures will be implemented. Such measures include:<br>• A WSI and programme of archaeological evaluation;<br>• Construction routes to use existing access, as far as possible. Temporary accesses would be removed and reinstated following the completion of the construction works;<br>• Avoidance of Conservation Areas within settlements;<br>• Project optimised design to minimise the removal of trees and hedgerows. Any sections of hedgerow and trees that are removed would be reinstated following construction;<br>• Where mature sycamores are required to be removed, they would be replanted with specimens as similar to the extant trees as possible, i.e., species, age and size;<br>• Grade II Listed building stone will be protected on Site and marked up on plans to increase awareness of position;<br>• Construction plant movements will be subject to agreement with the Canal and Rivers Trust with regards a maximum load and size; and<br>• Consideration of permanent low-level earthworks and/or tree/shrub planting to screen views of HAGIs and Block Valve installations.<br>Measures to protect archaeology will be defined once the survey work is completed. Best practice measures to avoid impacts on archaeology and historic buildings will also be set out in the CoCP. | Due to the preliminary nature of the PEIR, further assessment within the ES will be required to determine if any residual significant effects are present. However, the planned archaeological surveys will identify further possible mitigation to avoid or reduce the negative significant effects identified. |

| Receptor | Summary of Likely Environmental Effects | Anticipated Project Specific Mitigation (Subject to Change Once Assessment Complete) | Anticipated Conclusion |
|---|---|---|---|
| Water Environment | Within the PEIR, no significant effects have been identified in relation to the water environment following a review of relevant data.<br>The following effects were assessed, and considered to be negligible to minor (not significant):<br>• Deterioration in the water quality of surface and groundwater bodies affected by disturbance of contaminated land, or accidental spillage of pollutants (e.g. fuel or oil);<br>• Impacts on groundwater levels from dewatering activities and the effects of underground infrastructure;<br>• Changes to fluvial or tidal flood risk associated with raised structures in the floodplain (loss of floodplain storage and continuity, and/or change in floodplain flow conveyance); and<br>• Changes in channel morphology and fluvial geomorphological processes, should pipelines become exposed at watercourse crossings. | To reduce any potential significant or negative effects, embedded mitigation measures will be implemented. Such measures include:<br>• The pipeline will be completely buried underground;<br>• Optimisation of routing to reduce impacts on the water environment;<br>• Development of flood protection and drainage measures;<br>• Temporary access tracks design to manage surface water flooding;<br>• Management of subsurface flow pathways;<br>• A CoCP;<br>• A DWMP;<br>• An MMP; and<br>• A Pollution Prevention Plan (PPP).<br>Other best practice methods will be secured through the commitments of the project specific to the water environment.<br>Further water environment specific mitigation measures will be detailed in the ES if required. | The preliminary assessment considers the potential effects on watercourses and flood risk. At this stage, no significant effects have been identified, taking account of the embedded environmental measures. However, this will be confirmed within the ES once all of the Site visits have been undertaken, the flood modelling has been prepared and all of the data has been collected. |
| Landscape and Visual | The PEIR concluded that there are several potential significant negative effects on Landscape and Visual. 30 Landscape Character Area receptors are likely to have significant effects during the construction phase.<br>Other receptors including some settlements (Dones Green and Dunham Woodhouse), golf courses and canal and river users are also likely to have significant visual effects during the construction phase.<br>In regard to the operational phase year 1, some settlements (Dones Green and Dunham Woodhouse) may experience significant visual effects. The assessment of the longer-term effects in Year 15 of operation has yet to be carried out.<br>Negative visual effects would only remain significant during operation for users of the Manchester Ship Canal. | To reduce any potential significant or negative effects, embedded mitigation measures will be implemented. Such measures include:<br>• Minimising the construction storage areas;<br>• Minimising construction traffic on high sensitivity visual receptors;<br>• Minimising loss of trees and hedgerows;<br>• Minimising night- time visual impact of construction;<br>• Low level earth-works and screening; and<br>• Creation of an Outline Landscape Mitigation Plan and OCoP.<br>Further landscape specific mitigation measures will be detailed in the ES if required. | Further assessment will be required within the ES to determine whether there are any significant residual effects relating to landscape and visual, and any associated mitigation measures required. |

| Receptor | Summary of Likely Environmental Effects | Anticipated Project Specific Mitigation (Subject to Change Once Assessment Complete) | Anticipated Conclusion |
|---|---|---|---|
| Air Quality | No significant effects have been identified in relation to Air Quality within the PEIR.<br>Further assessment will be undertaken to support the ES and confirm the findings of outlined within the PEIR. Some of the air quality effects scoped into the PEIR for further assessment include:<br>• Fugitive dust emissions and increases in PM10 and PM2.5; and<br>• Combustion product emissions arising from the construction traffic will affect concentrations of pollutants. Changes in concentrations of pollutants have the potential to affect human receptors and can cause damage to sensitive ecological receptors. | To reduce any potential significant or negative effects, embedded mitigation measures will be implemented. Such measures include:<br>• Sensitive sites will be avoided where possible;<br>• Good practice air quality measures will be applied;<br>• A DMP will be implemented;<br>• A record of all dust and air quality complaints will be kept and regular site inspections will be carried out to monitor compliance with the DMP;<br>• Good practice Site management measures will be in place (e.g. avoid Site runoff, use barriers around dusty activities and use wet cleaning methods);<br>• Good practice measures when operating vehicles and machinery;<br>• Bonfires and burning waste materials will be avoided;<br>• Materials will be stored appropriately;<br>• Water-assisted dust sweeper(s) will be used; and<br>• Vehicles entering and leaving Site will be covered and use wheel washing facilities.<br>Further Air Quality specific mitigation measures will be detailed in the ES if required. | The preliminary assessment concludes that there will be no significant Air Quality effects on people and their health or ecology in the vicinity of the Project, once the embedded environmental measures are in place. This will be confirmed following additional assessment to support the ES. |
| Noise and Vibration | The preliminary assessment concluded that the majority of Noise effects would not be significant. However, some the likely significant effects, were identified, including:<br>• Noise from the trenchless crossing; and<br>• Noise from construction traffic.<br>Operational noise has not been assessed at the PEIR stage, and will therefore be undertaken to support the ES, alongside a detailed construction assessment. | To reduce any potential significant or negative effects, embedded mitigation measures will be implemented. Such measures include:<br>• A CEMP; and<br>• Best practice and industry guidance working standards.<br>Further noise specific mitigation measures will be detailed in the ES if required. | Through the implementation of the embedded mitigation measures, the significant effects specific to noise should be reduced. Further noise assessment will be required within the ES to determine whether there are any significant residual effects relating to both the construction and operational phase, and any associated mitigation measures required. |

| Receptor | Summary of Likely Environmental Effects | Anticipated Project Specific Mitigation (Subject to Change Once Assessment Complete) | Anticipated Conclusion |
|---|---|---|---|
| Traffic and Transport | The PEIR only considers the construction phase only, as limited traffic generation is anticipated during the operational phase.<br>There are a number of likely significant effects associated with traffic and transport during construction. These are as follows:<br>• Severance<br>o Negligible Impact Receptors: 8<br>o Minor Impact Receptors: 6<br>o Moderate Impact Receptors: 2<br>o Major Impact Receptors: 3<br>• Driver Delay<br>o Negligible Impact Receptors: 19<br>• Pedestrian Amenity, Delay, Fear and Intimidation<br>o Negligible Impact Receptors: 17<br>o Major Impact Receptors: 2<br>• Accidents and Safety<br>• Negligible Impact Receptors: 19 | To reduce any potential significant or negative effects, embedded mitigation measures will be implemented. Such measures include:<br>• Navigable waterways, railways, the SRN and major A roads will be crossed by trenchless technology;<br>• Where possible, settlements have been avoided in the HGV Routeing Strategy;<br>• AQMA avoided in HGV routeing strategy;<br>• Highways will be repaired following construction if required;<br>• PRoWs that cross the pipeline corridors will be managed or diverted over the shortest distance possible;<br>• All PRoWs will be returned to their pre-construction condition and signage used for temporary diversions;<br>• A Preliminary Construction Traffic Management Plan will be prepared;<br>• A Preliminary PRoW Management Plan will be prepared.<br>Further traffic and transport specific mitigation measures will be detailed in the ES if required.<br>Additional mitigation was identified for four receptors which still experienced significant effects following assessment of embedded mitigation (Highway Links RN14 (Moderate), RE4(Major), R10 (Major),R11 (Major) and SR9 (Major). These measures include limiting traffic on affected routes at key times such as school pick up and drop off; | With the embedded mitigation measures in place, the majority of significant effects will be minimised and will not be considered significant. With the additional mitigation measures in place it is considered that the residual effect of the Project on Receptor RN14 would reduce from Moderate to Minor and as such the impact to not significant. Furthermore, it is considered that the residual effect of the Project on Receptor RE4, RE10, RE11 and SR9 would reduce from Major to Minor and as such to not significant. |
| Ground Conditions | The PEIR concluded that no significant effects are expected in relation to ground conditions.<br>The following effects were assessed and considered negligible to minor effects (not significant)<br>• Mobilisation of contamination via pathways including groundwater, surface water, leaching from soil, migration of vapours and windblown dusts resulting in health effects;<br>• Build-up of gases in confined spaces in existing or newly constructed infrastructure on and adjacent to the land required for the Project | To reduce any potential significant or negative effects, embedded mitigation measures will be implemented. Such measures include:<br>• A CoCP;<br>• A CEMP;<br>• A MMP;<br>• A PPP; and<br>• Good practice measures will also be in place.<br>Further Ground Conditions specific mitigation measures will be detailed in the ES if required. | Through the implementation of the embedded mitigation measures, no significant effects are anticipated on the Ground Conditions through the construction, operation and maintenance, and decommissioning phases. However, this will be confirmed following further assessment within the ES. |

| Receptor | Summary of Likely Environmental Effects | Anticipated Project Specific Mitigation (Subject to Change Once Assessment Complete) | Anticipated Conclusion |
|---|---|---|---|
| | resulting in health effects and/or property damage (e.g. explosion of ground gases);<br>• Damage to existing and newly constructed infrastructure from land affected by contamination either through direct interaction or mobilisation of contamination; and<br>• Accidental spillages and leaks resulting in ground contamination and resultant risks to controlled waters during construction and ongoing operation and maintenance activities (e.g. fuel spills from vehicles/plant/equipment). Potential mobilisation of landfill leachate, which, if not properly managed, could impact upon the quality of controlled waters.<br>Further assessment will be undertaken to support the ES and confirm the findings of outlined within the PEIR. | | |
| Agriculture and Soil Resources | The preliminary assessment concludes that during construction the effects of soil compaction, soil erosion, damage to soil and damage to land drainage systems would not be significant.<br>However, it is considered that the permanent loss of agricultural land and soil resources would result in significant negative effects.<br>Damage to peat and its permanent loss is also anticipated to result in a significant negative effect at this stage. | To reduce any potential significant or negative effects, embedded mitigation measures will be implemented including:<br>• Topsoils and subsoils can be returned to their original state;<br>• Main rivers and canals, and road and rail crossings will be constructed using trenchless techniques;<br>• Avoidance of soils on SSSIs;<br>• Appropriate working widths will be provided to minimise environmental impacts;<br>• A SMP will be developed;<br>• The peat hierarchy will be followed where possible;<br>• A PMP will be developed where peat cannot be avoided;<br>• Soils will be conserved and re-instated where possible;<br>• Low ground pressure machinery will be utilised; and<br>• A DWMP will be prepared.<br>Further Agriculture and Soil Resources specific mitigation measures will be detailed in the ES if required. | The PEIR concludes that the majority of significant impacts on agriculture and soils can be mitigated through the embedded mitigation measures and will therefore be not significant.<br>However, the effect on peat is likely to remain significant following mitigation measures due to having a permanent effect on this. The permanent above ground development will be the minimum size needed for the Project's operation. The significance may be reduced depending on the design (e.g. by reducing the magnitude through a reduction in the area of land needed), or if high sensitivity receptor areas can be avoided. This will be further explored within the ES. |

| Receptor | Summary of Likely Environmental Effects | Anticipated Project Specific Mitigation (Subject to Change Once Assessment Complete) | Anticipated Conclusion |
|---|---|---|---|
| Land Use | The preliminary assessment concludes that there would be significant negative effects on Sutton Weaver, Dutton Lodge, Agden Bridge, Peterhouse Farm, Bartington, and Sandiway sand and gravel minerals resources without mitigation measures in place.<br>A significant negative effect on Runcorn Golf Club is also predicted as at least seven of the holes would be temporarily unavailable for approximately one year. The Vale Royal Golf Club may also experience significant negative effects, depending on which pipeline route option is taken in this location. The effects on Sandiway Gold Club and Barnton Cricket Club may also be significant without mitigation measures in place. A significant negative effect is also assumed for Big Hands Riding Club due to the proximity to construction activities.<br>The effects on all other natural resources and tourism/recreation receptors are not anticipated to be significant. | To reduce any potential significant or negative effects, embedded mitigation measures will be implemented. Such measures include:<br>• Fencing to provide screening alongside the golf course and the Proposed Development;<br>• Trenchless crossings will be utilised;<br>• The Preliminary Order Limits (POL) have been designed to avoid World Heritage Sites, National Nature Reserves and Registered Parks and Gardens; and<br>• The POL have been designed to avoid or minimise conflict with local nature reserves and National Trust where possible.<br>Further land use specific mitigation measures will be detailed in the ES if required. | Due to the preliminary nature of the PEIR, further assessment within the ES will be required to determine if any residual significant effects are present. |
| People and Communities | The PEIR identifies how disruption to travel and the ability for individuals and communities to access land and amenities during the Project's construction may result in significant negative effects.<br>The impact on employment markets may result in significant negative effects as there is an existing demand for construction workers in the project area and the Project may therefore increase the current labour supply shortage.<br>The PEIR also highlights that there may be significant beneficial effects associated with the contribution of the Project towards the future supply of hydrogen and the decarbonisation of industrial activity. However, there is public concern about the safety and costs of hydrogen use.<br>All other potential effects on people and communities are not anticipated to be significant at this stage. However, will be confirmed within the detailed ES. | To reduce any potential significant or negative effects, embedded mitigation measures will be implemented. Such measures include:<br>• Preparation of a skills and employment strategy;<br>• Standard best practice mitigation measures will be employed to avoid and minimise potential effects on local businesses and recreational facilities and more widely on tourism recreation facilitates; and<br>• A public-facing website and participation within local forums to provide information, community support and engagement in order to respond to general public interest and address concerns.<br>Further people and communities' specific mitigation measures will be detailed in the ES if required. | Due to the preliminary nature of the PEIR, further assessment within the ES will be required to determine if any residual significant effects are present. |
| Major Accidents and Disasters | The preliminary assessment concludes that, due to the current uncertainties around risk from hydrogen infrastructure, and the current stage of the Project | To reduce any potential significant or negative effects, embedded mitigation measures will be implemented. Such measures include: | The PEIR highlights how the embedded measures, particularly the design |

| Receptor | Summary of Likely Environmental Effects | Anticipated Project Specific Mitigation (Subject to Change Once Assessment Complete) | Anticipated Conclusion |
|---|---|---|---|
| | design, there is potential for significant effects arising from the release of hydrogen from HAGI Sites on people or other environmental features.<br>The Project, through the Development Consent Order, will be review by the Health and Safety Executive to ensure that it meets their requirements.<br>. | • Sufficient health and safety will be in place to ensure compliance with health and safety legislation, including notifying HSE that the Project will represent a new Major Accident Hazard Pipeline;<br>• The Project route will be consulted upon with relevant consultants to ensure the route avoids transport networks, hazardous pipelines or other hazardous sites or crosses safely in accordance with industry standards;<br>• The Applicant will develop and adhere to a Safety Management System and CoCP;<br>• Good practice design will be implemented and design safety engineering will be in place;<br>• The Project will ensure that any workforce populations for constructing or operating the Project are in a location that would not be 'Advised Against' as defined by the HSE LUP Methodology;<br>• All structures will be designed under the CDM Regulations;<br>• A specialist UXO contractor will provide a detailed desk study;<br>• All lifting will be carried out in a safe manner;<br>• The Proposed Development will comply with the Dangerous Substances and Explosive Atmospheres Regulations 2002; and<br>• The Project will comprise a route and design which the HSE 'does not advise against' granting consent on the basis of public safety, in line with its published methodologies and standard Land Use Planning Practices.<br>Further major accidents and disasters specific mitigation measures will be detailed in the ES if required. | engineering processes, have the aim of reducing the risk of all potential major accidents to 'As Low As Reasonably Practicable' (as required by Health & Safety at Work Act 1974) and therefore a not significant effect.<br>Following further refinement of the design, a more detailed assessment of how the design of the Project has embedded risk reductions will be available in the ES.<br>The assessment will be updated to reflect the above, and any further relevant information that arises from the surveys due to be carried out for other environmental topics. A more detailed risk assessment of the impact of releases from the HAGIs will also be carried out.<br>Following these steps, the conclusions will be presented within the ES. |
| Climate Change- Greenhouse Gas Emissions | The PEIR identifies that the Proposed Development is assessed as having a minor adverse effect on the following receptors and is therefore assessed as being not significant. | To reduce any potential significant or negative effects, embedded mitigation measures will be implemented. Such measures include: | The preliminary assessment concludes that there would no significant effects on GHG emissions, and the Project |

| Receptor | Summary of Likely Environmental Effects | Anticipated Project Specific Mitigation (Subject to Change Once Assessment Complete) | Anticipated Conclusion |
|---|---|---|---|
| | Construction<br>• Raw materials supply, transport and manufacture;<br>• Construction transport; and<br>• Construction process stage.<br>Operation<br>• Operational energy use.<br>Decomissioning<br>• End of life stage: deconstruction, transport, waste processing for recovery and disposal.<br>Further assessment will be undertaken to support the ES and confirm the findings of outlined within the PEIR. | • A CoCP will be produced, within this, measures to reduce GHG emissions will be detailed. Further to this, measures to minimise emissions from construction traffic and encourage a circular economy will be noted; and<br>• An outline PMP will be produced for areas where peat cannot be avoided. This will include the measures to be employed to protect peat during handling, storage and reinstatement, to promote its reuse within the Preliminary Order Limits where possible, or offsite if a suitable receptor site can be identified, and avoid it becoming waste.<br>Further climate change GHG specific mitigation measures will be detailed in the ES if required. | would be in line with the Government's carbon budgets/targets. Further assessment will be undertaken to support the ES and confirm the findings of outlined within the PEIR. |
| Climate Change Resilience | A number of likely significant effects have been identified and scope in within the PEIR. Some of the likely receptors and significant effects scoped in are detailed below.<br>Human health:<br>• Increased heat stress or heat exhaustion experienced by staff;<br>• Risk of wildfires affecting the operational and maintenance workforce; and<br>• Wet weather leading to increased possibility of slips, trips and falls.<br>Building and Infrastructure:<br>• Flooding of construction Site access roads causing delays to construction programme;<br>• Erosion of soils resulting in exposing or damage to the pipeline; and<br>• There is an increased risk of disruption to construction work, such as cranes unable to operate in high winds.<br>Natural environment:<br>• Landscape and biodiversity planting could fail resulting in increased management and associated environmental costs e.g. water use; | To reduce any potential significant or negative effects, embedded mitigation measures will be implemented. Such measures include:<br>• Development of a CoCP;<br>• A Risk Assessment Method Statement (RAMS) will be produced;<br>• A Flood Risk Assessment (FRA);<br>• Relevant Tool Box talks;<br>• A DWMP; and<br>• Effective design of the BVs in regard to climate change and flood risk.<br>Further climate change resilience specific mitigation measures will be detailed in the ES if required. | The preliminary assessment concludes that there are likely to be no significant effects of climate change on the Project with the embedded environmental measures. Further assessment will be undertaken to support the ES and confirm the findings of outlined within the PEIR. |

| Receptor | Summary of Likely Environmental Effects | Anticipated Project Specific Mitigation (Subject to Change Once Assessment Complete) | Anticipated Conclusion |
|---|---|---|---|
| | • Flooding in areas of proposed biodiversity and landscape planting resulting in failure and increased maintenance requirements; and<br>• Increased vegetation growth affecting above ground equipment and requiring increased maintenance requirements. | | |
| Inter-project cumulative effects | Given the preliminary stage of the process, sufficient detail is not currently available to enable a detailed assessment of inter-project effects to be undertaken. Therefore, at this stage the preliminary assessment of inter-project cumulative effects has focused on those receptors where potential significant effects have been predicted in respect of at least two or more environmental topics.<br>The Inter-Project Effects Assessment for the construction stage assessed the potential for inter-project effects for the following topics:<br>• Biodiversity;<br>• Historic Environment;<br>• Water Environment;<br>• Landscape and Visual;<br>• Air Quality;<br>• Noise and Vibration;<br>• Traffic and Transport;<br>• Ground Conditions;<br>• Land Use;<br>• People and Communities; and<br>• Major Accidents and Disasters.<br>At this stage, there is potential for significant inter-project effects on the following receptors:<br>• Runcorn Golf Club (during construction phase);<br>• Sandiway Golf Club (during construction phase); and<br>• Fiddlers Ferry (True Fit) Golf Course (during construction phase).<br>Furthermore, there are some receptors that have multiple minor impacts which could potentially accumulate to a higher significance, these being the following: | At the ES stage, where common receptors have been identified, the potential for significant inter-project effects to arise will be considered in detail and further narrative will be provided as to whether, for example, any additional mitigation could be introduced to potential significant effects. | Further detail will be provided within the ES. |

| Receptor | Summary of Likely Environmental Effects | Anticipated Project Specific Mitigation (Subject to Change Once Assessment Complete) | Anticipated Conclusion |
|---|---|---|---|
| | • Mersey Estuary SPA, Ramsar Site and SSSI (during construction phase);<br>• Ravenhead Ponds LWS (during construction phase);<br>• Pendlebury Brook (SJ493920-SJ515914) LWS (during construction phase);<br>• Moore Nature Reserve (LWS) (during Construction and Operation Phase);<br>• Rows Wood (LWS) (during construction phase);<br>• Thatto Heath Meadows (LWS) (during construction phase);<br>• Sutton Manor (LWS) (during construction phase);<br>• Lower Mersey Basin and North Merseyside Permo-Triassic Sandstone Aquifers (during construction phase);<br>• Manchester and East Cheshire Permo-Triassic Sandstone Aquifers (during construction phase);<br>• Sankey and Glaze Carboniferous Aquifers (during construction phase);<br>• Weaver and Dane Quaternary Sand and Gravel Aquifers (during construction phase);<br>• Wirral and West Chester Permo-Triassic Sandstone Aquifers (during construction phase);<br>• High Legh Park Golf Club (during construction phase);<br>• Manchester Ship Canal (during construction phase);<br>• Frodsham Town Centre and 6 Central Street Locations (during construction phase);<br>• Manchester Road, between Monmouth Close and Dam Lane and M6 J21 (during c construction phase);<br>• Between M56 and A558, Ring O Bells and Delph Lane (during construction phase); and<br>• Settlements and Air Quality measures between M60 J10 and J9 (during construction phase). | | |

# 12. INTER-PROJECT EFFECTS

12.1.1. Inter-project effects arise from the interaction of the Proposed Scheme with other relevant development proposals. An assessment of inter-project effects has been undertaken for each scheme, which considers cumulative effects from several relevant schemes in the vicinity of the Proposed Developments.

12.1.2. Table 12-1 and Table 12-2 identify inter-project effects associated with interactions between the Onshore Carbon Dioxide Pipeline, the Offshore $CO_2$ Transport and Storage, the Point of Ayr Terminal and the Hydrogen Production Facility, based on Inter-Project Effect Assessments undertaken to date.

12.1.3. The HDD Pipeline that crosses the River Dee has been excluded from this assessment as it has been considered within the assessment for the Onshore Carbon Dioxide Transportation Pipeline.

12.1.4. The Spur Line Proposed Developments (Runcorn and Padeswood) have been reviewed however, due to the early stage of development, a cumulative effects assessment has not yet been undertaken for these schemes. Once the Proposed Developments are further through the planning process, the inter-projects assessments will take place and be determined. A cumulative effects assessment was not undertaken to support the TCPA for the Protos Spur as this was a non-EIA development.

12.1.5. Inter-project effects between the Point of Ayr Terminal and the HyNet North West Hydrogen Pipeline were scoped out of the cumulative effects assessment. Due to the distance between the schemes, it was considered that the Hydrogen Pipeline was outside of the Zone of Influence of the Point of Ayr Terminal Development, therefore no inter project effects were anticipated.

12.1.6. The HyNet North West Hydrogen Pipeline is currently at an early stage in the DCO process. Therefore, the Inter-project effects have been assessed using information provided in the PEIR and an estimation of the likely effects based on the scale and type of development.

12.1.7. Table 12-1 and Table 12-2 are not summaries of all inter-project effects assessed for the different schemes, but instead they highlight the effects between the projects outlined within this document. Where topics have been scoped out of the cumulative effects assessment, these have not been considered further.

## Table 12-1 – Summary of Inter-Project Effects – Construction Phase

| Development | | Receptor | Summary of Environmental Effect | Cumulative Effect |
|---|---|---|---|---|
| $CO_2$ Onshore Pipeline | Point of Ayr Terminal | Biodiversity | Construction stage residual effects of the $CO_2$ Onshore Pipeline range between negligible and minor adverse. Minor adverse effects are anticipated to be observed on statutory designated sites, non-statutory designated sites, habitats of conservation importance, aquatic habitats (watercourse), riparian mammals, amphibians, bat, wintering birds, barn owls and fish.<br>Minor adverse residual effects relating to the Point of Ayr Terminal are anticipated on local fauna: bats, badgers, water voles, otters, fish, common toads, sand lizards, birds (SPA/Ramsar species) and aquatic macroinvertebrates; and flora, hedgerows habitat of principle importance (HPI).<br>The similar nature of the Point of Ayr Terminal means that inter-project effects are likely to occur. | Some of the same receptors will be adversely affected, however this is not likely to be significant or lead to a significant magnification of overall effects to those sensitive receptors. As a result of this, a negligible to minor adverse (not significant) effect is anticipated. |
| $CO_2$ Onshore Pipeline | Point of Ayr Terminal | Materials and Waste | Construction stage residual effects of the $CO_2$ Onshore Pipeline will be limited to minor adverse effects due to material resource consumption and the reduction in landfill capacity.<br>Minor adverse effects are also anticipated in relation to both material use and landfill capacity during the construction stage of the Point of Ayr Terminal.<br>Both developments would involve some similar construction activities and potential waste generation/material requirements, resulting in a potential for an inter-project effect. Existing policies relating to the development and the regulatory environment should ensure that these effects are not significant. | Due to both developments having non-significant residual effects, a magnification of adverse effects to a significant level is not anticipated due to the aforementioned policy and regulatory framework. As a result, a minor adverse effect is anticipated. |
| $CO_2$ Onshore Pipeline | Point of Ayr Terminal | Traffic and Transport | Construction stage residual effects of the $CO_2$ Onshore Pipeline are anticipated to be to minor adverse (not significant) for Severance, Pedestrian amenity, Fear and Intimidation, Driver Delay and Highway Safety. Pedestrian Delay was assessed as negligible.<br>Significant adverse effects are anticipated from Severance and Fear and Intimidation at link locations 1, 3, 6 and 11 (Racecourse Lane, Lleprog Lane, Cornist Lane and Gamfa Wen) for the Point of Ayr Terminal.<br>Both developments would result in large scale traffic movements sharing the road network, particularly in the area of | The inter-project effect of these effects would result in a minor adverse (not significant) effect. Any effects from the development on the link locations would be indirect and not magnify effects from the individual developments to a significant degree. |

| Development | | Receptor | Summary of Environmental Effect | Cumulative Effect |
|---|---|---|---|---|
| | | | the A55 around Ewloe Green. Severance would likely result from both developments; however, the location of these severance issues would likely be at different links due to the CO2 Onshore Pipeline being located over 3km south of the Point of Ayr Terminal. Construction vehicles exiting the A55 to construction the development would not use any of the roads identified as link locations. | |
| $CO_2$ Onshore Pipeline | Point of Ayr Terminal | Water Resources and Flood Risk | Slight adverse effects are anticipated on water quality, water flow, groundwater, and flood risk from the Point of Ayr Terminal construction phase. Although not directly intersecting the same receptors as the Point of Ayr Terminal, the $CO_2$ Pipeline would have similar paths to effects on other maritime receptors such as Dee Estuary SSSI and Liverpool Bay SPA. As a result of this, inter-project effects are likely to occur in relation to water quality, water flow, groundwater, and flood risk.<br>The $CO_2$ Onshore Pipeline identifies neutral to slight adverse (not significant) effects on the majority of receptors during the construction phase.<br>However, adverse effects on the Alltami Brook, near Northop Hall have been identified. This is because this watercourse will be crossed via an open cut trench method which will permanently impact the bedrock and the natural form of the watercourse. However, the Alltami Brook is located circa 23km south east of the Point of Ayr Terminal, therefore inter-project effects are unlikely. | The inter-project effect is anticipated to be minor adverse. This is because it is likely that the effects on water resources and flooding from the developments will not be magnified significantly compared to the developments in isolation. |
| Point of Ayr Terminal | $CO_2$ Transport and Storage - Offshore | Climate Resilience | Minor Adverse effects are anticipated in relation to the Point of Ayr Development from the flooding of sites and components. The Offshore Proposed Development is a marine development and would not have any terrestrial components. | The Offshore Development is not anticipated to result in any combination effect with the PoA's flood risk and run-off adverse effects. Therefore, a negligible effect is anticipated. |
| Point of Ayr Terminal | $CO_2$ Transport and Storage - Offshore | Biodiversity | Minor adverse effects are anticipated on local fauna: bats, badgers, water voles, otters, fish, common toads, sand lizards, birds (SPA/Ramsar species) and aquatic macroinvertebrates; and flora, hedgerows (HPI) for the Point of Ayr Development. The Offshore Proposed Development is a marine development with the potential for inter-project effects limited to marine, aquatic and coastal based ecological receptors. As a result, no | With the considerations outlined, the overall inter-project effect is appraised to be Minor Adverse. |

| Development | | Receptor | Summary of Environmental Effect | Cumulative Effect |
|---|---|---|---|---|
| | | | inter-project effects would likely occur in relation to badgers, hedgerows or bats. Inter-project effects would potentially occur in relation to sand lizards, otters, water voles, common toads, fish, birds (SPA/Ramsar species) and aquatic macroinvertebrates.<br>As the Offshore Proposed Development would be connected to the PoA Terminal and foreshore it is assumed that adverse effects on these receptors would also occur as a result of the development. With the exception of fish, these would likely be to a reduced level in comparison to the PoA Proposed Development (due to the increased distance of the development from the coastal boundary) so any inter-project effect would not be significant. | |
| Point of Ayr Terminal | $CO_2$ Transport and Storage - Offshore | Landscape and Visual | Up to Minor adverse or Moderate adverse effects are anticipated on LCAs and visual amenity in relation to the BVS, PoA and Foreshore work elements of the PoA Proposed Development (depending on receptors and receptor location). The Offshore Proposed Development is a marine development and would not have any terrestrial components. As a result of this, inter-project effects are anticipated to be limited to visual amenity and not include effects on LCAs or effects relating to BVS works. Construction works would involve increased maritime traffic to facilitate installation of underwater cables. These would have an adverse effect but are unlikely to be significant due to the concentrated nature of construction activities (a linear cables installation). | An inter-project effect would occur, but this is unlikely to magnify the already significant adverse effects of the PoA Terminal and Foreshore Works to a significant extent. As a result, a Minor Adverse inter-project effect is anticipated. |
| Point of Ayr Terminal | $CO_2$ Transport and Storage - Offshore | Materials and Waste | Minor adverse effects are anticipated in relation to both material use and landfill capacity for the PoA Development. The Offshore Proposed Development is a large-scale offshore project connecting the PoA Proposed Development to offshore structures. The development is likely to have extensive material requirements and subsequently potential waste generation. Waste generation would likely be managed through activities carried out in the construction stage for the respective developments and as a result of these mitigation measures a measurable inter-project effect in relation to waste is not anticipated. Due to similarities with elements of the PoA Proposed Development there is likely to be an inter-project | Following mitigation measures a measurable inter-project effect in relation to waste is not anticipated.<br>A minor adverse inter-project effect though on material requirements is anticipated. |

| Development | | Receptor | Summary of Environmental Effect | Cumulative Effect |
|---|---|---|---|---|
| | | | effect though on material requirements. As major manufacturing and material requirements are not anticipated to be sourced entirely locally, and national/international capacity would be able to accommodate a development of this size, a minor adverse effect is anticipated. | |
| Point of Ayr Terminal | $CO_2$ Transport and Storage - Offshore | Noise and Vibration | Minor adverse effects are anticipated from both noise and vibration (from piling and compaction) from construction activities from the PoA Proposed Development.<br>The Offshore Proposed Development is a marine based development and is assumed that construction traffic and activities would be entirely marine based. As a result, affected receptors would be limited to those in the vicinity of the PoA Terminal and Foreshore Works, the closest terrestrial point to the development. | The receptors identified exceed the maximum ZOI for the effects of noise and vibration (300m for construction). As a result, a negligible inter-project effect is anticipated. |
| Point of Ayr Terminal | $CO_2$ Transport and Storage - Offshore | Population and Human Health | Minor Adverse effects are anticipated from the PoA Terminal and Foreshore Works on access to community land, access to businesses, disruption to recreation and noise. Minor to moderate adverse effects are anticipated on access to private property and access to sections of beach. Minor adverse effects are also anticipated from the BVS works on disruption to recreation and access to private properties.<br>The development is a marine development and would not have any terrestrial components. As a result, it is not anticipated to result in any combination effect with the TCPA Proposed Development. Therefore, a Negligible effect is anticipated. | No in-combination effects are anticipated between the two developments. Therefore, a Negligible effect is anticipated. |
| Point of Ayr Terminal | $CO_2$ Transport and Storage - Offshore | Water Resources and Flood Risk | Slight Adverse effects are anticipated on water quality, water flow, groundwater and flood risk resulting from the PoA Proposed Development.<br>As the development is a marine development residual adverse effects on flood risk, groundwater and watercourse blockage (water flow) is not anticipated. However, potential residual effects in relation to water quality are anticipated as construction activities would be entirely marine based and have the potential for pollution incidents. These effects are unknown but are likely to be localised due to the linear alignment of the subsea cables. | An inter-project effect is anticipated to occur though due to the localised effects of both the Offshore Proposed Development and PoA Proposed Development, however this would not be significant. Therefore, a Minor Adverse effect is anticipated. |

| Development | | Receptor | Summary of Environmental Effect | Cumulative Effect |
|---|---|---|---|---|
| $CO_2$ Onshore Pipeline | $CO_2$ Transport and Storage - Offshore | Biodiversity | Construction Stage residual effects of the $CO_2$ Onshore Pipeline range between negligible and minor adverse. Minor adverse effects are anticipated to be observed on statutory designated sites, non-statutory designated sites, habitats of conservation importance, aquatic habitats (watercourse), riparian mammals, amphibians, bat, wintering birds, barn owls and fish.<br>The Offshore Proposed Development is a marine development with the potential for inter-project effects limited to marine, aquatic and coastal based ecological receptors. This, combined with the relative distance of the development from the Onshore Proposed Development, means that inter-project effects would potentially occur in relation to statutory designated sites, aquatic habitats and fish. Information on the development is limited but as it is associated with the PoA Terminal and Foreshore Works and HyNet Carbon Dioxide Pipeline BVS Site) (both in its nature and proximity, connected directly off the Talacre coast), it may therefore be assumed that there would be similar residual effects to development. | With the exception of fish, any inter-project effect would not be significant. In the case of fish, these would likely result in comparable residual effects, though mitigation measures are likely to ensure these effects remain not significant. With these considerations, the overall inter-project effect is appraised to be minor adverse. |
| $CO_2$ Onshore Pipeline | $CO_2$ Transport and Storage - Offshore | Waste and Materials | Construction stage residual effects of the Onshore Proposed Development will be limited to minor adverse effects due to material resource consumption and the reduction in landfill capacity.<br>The Offshore development is a large-scale offshore project connecting the PoA development to offshore structures. The development is likely to have extensive material requirements and subsequently potential waste generation. Waste generation would likely be managed through activities carried out in the construction stage for the respective developments and as a result of these mitigation measures a measurable inter-project effect in relation to waste is not anticipated. | Due to similarities with elements of the Onshore Proposed Development there is likely to be an inter-project effect on material requirements. As major manufacturing and material requirements are not anticipated to be sourced entirely locally, and national/international capacity would be able to accommodate a development of this size, a minor adverse effect is anticipated. |
| $CO_2$ Onshore Pipeline | Hydrogen Pipeline | Cultural Heritage | Construction stage above ground residual effects of the $CO_2$ Onshore Pipeline will be limited to minor adverse effects on Aston Hall heritage asset.<br>The Hydrogen Pipeline is located in the vicinity of the Stanlow AGI element of the $CO_2$ Onshore Pipeline, with the potential to | As the Onshore $CO_2$ Pipeline only has residual effects on one listed building (Aston Hall), located over 15km away from Stanlow and these assets, a |

| Development | | Receptor | Summary of Environmental Effect | Cumulative Effect |
|---|---|---|---|---|
| | | | adversely affect the setting of listed buildings in Thornton-le-Moors and Elton and, due to the scale of the development, have adverse effects on many heritage assets to the east of Elton in the regions of Warrington and Northwich. | negligible inter-project effect is anticipated. |
| $CO_2$ Onshore Pipeline | Hydrogen Pipeline | Biodiversity | Construction stage residual effects of the Onshore $CO_2$ Pipeline range between negligible and minor adverse. Minor adverse effects are anticipated to be observed on statutory designated sites, non-statutory designated sites, habitats of conservation importance, aquatic habitats (watercourse), riparian mammals, amphibians, bat, wintering birds, barn owls and fish.<br>In absence of assessment details for the Hydrogen Pipeline the level of these effects is assumed to be similar to that of the $CO_2$ Pipeline.<br>The nature of the development being similar to that of the Hydrogen Pipeline Development means that similar residual effects are likely to occur to those in the vicinity of Section 1 of the $CO_2$ Pipeline, as well as extensive additional effects to the east and northeast along the development alignment. These effects would occur on statutory designated sites such as the Mersey Estuary, Local Nature Reserves (LNRs), aquatic habitats, deciduous woodland and fauna such as bats or riparian mammals. | Following a worst case assumption, these effects would occur and magnify those of the $CO_2$ Pipeline. Due to the nature of receptors in the areas, such as the scale of the Mersey Estuary and isolated nature of the LNRs and Deciduous Woodland it is likely that these effects will not compromise these receptors. Therefore, a minor adverse inter-project effect is anticipated. |
| $CO_2$ Onshore Pipeline | Hydrogen Pipeline | Land and Soils | Construction stage residual effects of the Onshore $CO_2$ Pipeline will be limited to minor adverse effects due to the sterilisation of mineral resources. As the Hydrogen Pipeline is similar in nature and location to the $CO_2$ Pipeline (i.e. extensive underground pipeline in the vicinity of the Stanlow and Ince AGIs) equivalent residual effects would likely occur.<br>Effects on mineral resources would be likely to occur due to the required excavations to facilitate the development and as a result an inter-project effect is anticipated. This would magnify the effects on material resources compared to the $CO_2$ Pipeline in isolation. | Magnification of effects is unlikely to be significant due to the minor level of effects for both the Hydrogen Pipeline and the $CO_2$ Pipeline. As a result, a minor adverse effect inter-project effect is anticipated. |
| $CO_2$ Onshore Pipeline | Hydrogen Pipeline | Landscape and Visual | Construction stage residual effects of the Onshore $CO_2$ Pipeline range up to moderate adverse (significant). Up to moderate adverse effects are anticipated on residential and recreational receptors from visual amenity, depending on viewpoint | Due to the limited overlap of the Hydrogen Pipeline and the $CO_2$ Pipeline an inter-project effect would be limited to receptors in the vicinity of |

| Development | | Receptor | Summary of Environmental Effect | Cumulative Effect |
|---|---|---|---|---|
| | | | location. Additionally, up to moderate adverse (significant) effects are anticipated on Landscape Character Areas (LCAs). The Hydrogen Pipeline is in the vicinity of EAGI9 viewpoint and the Mersey Valley and Shropshire, Cheshire and Staffordshire LCAs. These receptors are anticipated to experience moderate adverse and minor adverse respectively. The Hydrogen Pipeline would likely have similar residual effects in the area due to similar construction activities and alignment routing out of Stanlow. | Stanlow. In line with this, an inter-project effect would be anticipated for visual amenity and the aforementioned LCAs in the vicinity of Section 1. This inter-project effect is appraised as minor adverse as, while measurable, would not significantly magnify the effects of either the development or the DCO Proposed Development in isolation. |
| $CO_2$ Onshore Pipeline | Hydrogen Pipeline | Materials and Waste | Construction stage residual effects of the $CO_2$ Onshore Pipeline will be limited to minor adverse effects due to material resource consumption and the reduction in landfill capacity. The Hydrogen Pipeline is similar to that of the $CO_2$ Pipeline and therefore, the development is likely to have similar material requirements and potential waste generation with similar specific material requirements to construct extensive pipeline. With these similarities in mind, an inter-project effect would likely occur in relation to both material usage and waste generation. | The adverse effects on waste generation would likely be mitigated through required backfilling of excavation activities that would occur in the construction stage. As a result of these likely measures, the inter-project effect would be minor adverse. |
| $CO_2$ Onshore Pipeline | Hydrogen Pipeline | Noise and Vibration | Construction stage residual effects of the Onshore $CO_2$ Pipeline include significant effects (equated to moderate adverse) on residential receptors due to construction noise (daytime and/or evening and night-time) in Sections 1-6. All other receptors were found to be not significant, for the purpose of the Construction stage assessment these are equated to minor adverse. The Hydrogen Pipeline is a large-scale linear project adjacent to the $CO_2$ Pipeline likely requiring extensive construction traffic throughout the local road network. The Hydrogen Pipeline is also likely to have a similar construction methodology due to the similarities in nature and scale to the $CO_2$ Pipeline. Due to this there is likely to be an inter-project effect. It is notable that this will occur in an area with a concentration of sensitive receptors within 500m (Ince and Elton villages, within the vicinity of Stanlow and Ince AGIs). | A magnification of effects is not likely to be significant as, although being two large scale projects, there would likely be fairly minimal concurrent works of which the magnified construction noise sensitive receptors would be exposed. It is anticipated that this magnified construction noise would be effectively managed by collaborative mitigation measures. Therefore, the inter-project effect would be minor adverse. |

| Development | | Receptor | Summary of Environmental Effect | Cumulative Effect |
|---|---|---|---|---|
| $CO_2$ Onshore Pipeline | Hydrogen Pipeline | Population and Human Health | Construction stage residual effects of the Onshore $CO_2$ Pipeline will be observed on human receptors ranging from negligible to moderate adverse (significant) depending on the Section of the Proposed Development. moderate adverse effects are associated with Sections 2, 3 and 4, with all other Sections seeing minor adverse effects.<br>The Hydrogen Pipeline is in proximity to Section 1 of the $CO_2$ Pipeline. The effects on Population and Human Health receptors in this Section are limited to minor adverse effects from severance of routes, restriction of access, intimidation of users and loss of amenity value on non-residential commercial receptors in Elton and recreational users of national cycle routes.<br>The Hydrogen Pipeline is likely to have similar effects on these receptors due to the similar nature of the development and similar construction requirements. An inter-project effect is anticipated to occur. | As the Hydrogen Pipeline is further away from the affected receptors than the $CO_2$ Pipeline and would be separated from them in most cases by the $CO_2$ Pipeline, the inter-project effects would be limited to minor adverse. |
| $CO_2$ Onshore Pipeline | Hydrogen Pipeline | Traffic and Transport | Construction stage residual effects of the Onshore $CO_2$ Pipeline will be limited to minor adverse due to severance, pedestrian amenity and fear and intimidation. These effects are associated with 18 different road locations associated with the BVS sites and the pipeline. All effects of the $CO_2$ Pipeline are minor adverse in the area of the Hydrogen Pipeline (Section 1, near to Elton and Stanlow AGIS).<br>Due to the similarities but larger scale of the Hydrogen Pipeline in comparison to the $CO_2$ Pipeline, it is assumed that the development would have similar or larger residual effects. | As construction traffic requirements in the vicinity of the development would likely be limited due to facilitating those construction activities at the end of the two alignments, a significant magnification of effects is not anticipated. However, a measurable effect on severance, pedestrian amenity and fear and intimidation would likely be observed in communities such as Elton. Therefore, a minor adverse inter-project effect is anticipated. |
| $CO_2$ Onshore Pipeline | Hydrogen Pipeline | Water Resources and Flood Risk | Construction stage residual effects of the $CO_2$ Pipeline will be mostly limited to minor adverse on water quality, hydrology and hydromorphological processes and groundwater on assets such as the Dee Estuary SPA and Mersey Estuary SSSI. In addition, minor adverse effects are anticipated on residents and | Due to the linear nature of the developments and limited overlap between them (mostly occurring between the Stanlow and Ince AGIs) the resultant |

| Development | Receptor | Summary of Environmental Effect | Cumulative Effect |
|---|---|---|---|
| | | other human receptors due to increased flood risk. The effects on the hydrology and hydromorphological processes of Alltami Brook are anticipated to be moderate adverse (significant).<br>No assessment of flood risk or water resources is available for the Hydrogen Pipeline. However, as the development is in the vicinity of Gale Brooks and other minor brooks and ditches, an effect is likely.<br>Depending on the alignment of the development, a measurable inter-project effect would be anticipated as it is assumed that these watercourses would be cut during construction works (a main source of residual effects in the area from the $CO_2$ Pipeline). | inter-project effect is not anticipated to magnify the effect of the $CO_2$ Pipeline significantly, therefore a minor adverse effect is anticipated. |

## Table 12-2 – Summary of Inter-Project Effects – Operational Phase

| Interface | | Receptor | Summary of Environmental Effect | Cumulative Effect |
|---|---|---|---|---|
| $CO_2$ Onshore Pipeline | Point of Ayr Terminal | Biodiversity | Minor adverse effects associated with the Point of Ayr Terminal operational phase are anticipated on GCN, sand lizards and aquatic macroinvertebrates.<br>operational phase residual effects on biodiversity for the $CO_2$ Pipeline have been assessed as negligible.<br>Adverse effects on fauna are likely to be mainly due to increased noise and lighting levels. The developments will have similar operational activities so similar inter-project adverse effects are possible. However, due to the lack of coastal elements of the $CO_2$ Pipeline, these effects would be limited to aquatic macroinvertebrates and sand lizards. | The inter-project effects from these are unlikely to be significant as direct effects on local populations will not be observed simultaneously but instead by measured on a regional population level. As a result, a minor adverse inter-project effect is anticipated. |
| $CO_2$ Onshore Pipeline | Point of Ayr Terminal | Water Resources and Flood Risk | Slight adverse effects are anticipated for the Point of Ayr Terminal in relation to an increased pollution risk of oil, hydrocarbons and other hazardous substances. The operation effects will be concentrated around the PoA Terminal (the pollution risks to surface and ground water).<br>Operation phase residual effects of the $CO_2$ Pipeline will be mostly limited to minor adverse associated with the loss of riparian vegetation in watercourses, watercourse hydrology and hydromorphological processes, groundwater levels and flow and groundwater quality. The effects on the hydrology and hydromorphological processes of Alltami Brook and the effects of the installation of permanent artificial structures in watercourses are anticipated to be moderate adverse (significant). | A negligible inter-project effect is therefore anticipated as affected receptors are too far from the development (over 17km) to magnify any residual effects. |
| $CO_2$ Onshore Pipeline | Hydrogen Pipeline | Climate Resilience | operation phase residual effects of the $CO_2$ Pipeline will be limited to minor adverse effects associated with the shrinking and cracking of soils.<br>The similarities in the nature and scale of the operational Hydrogen Pipeline and the $CO_2$ Pipeline mean that similar residual effects are likely relating to the shrinking and cracking of soils. As a result of this, and the proximity of the developments (overlapping in the Ince area), an inter-project effect is also anticipated to occur. | Due to the linear nature of the development and the limitation of the overlap to the Ince area, a significant magnification of the effects in comparison to the $CO_2$ Pipeline in isolation is not anticipated. Therefore, the inter-project effect is not anticipated to be significant. A |

| Interface | | Receptor | Summary of Environmental Effect | Cumulative Effect |
|---|---|---|---|---|
| | | | | minor adverse effect is anticipated. |
| $CO_2$ Onshore Pipeline | Hydrogen Pipeline | Landscape and Visual | Operation phase residual effects of the Onshore $CO_2$ Pipeline range up to moderate adverse (significant). The residual effects in Section 1 of the DCO Proposed Development are limited to minor adverse effects on the visual amenity of residential receptors in the vicinity of viewpoint EAGI9.<br>The residual effects of the Hydrogen Pipeline are not known in this area but, due to the similar nature of the development and the $CO_2$ Pipeline, they are anticipated to be similar. | Views of the development from EAGI9 will be likely. However, as the infrastructure visible, (Stanlow AGI) is shared by the Hydrogen Pipeline and the $CO_2$ Pipeline, a negligible inter-project effect is anticipated. |
| $CO_2$ Onshore Pipeline | Hydrogen Pipeline | Water Resources and Flood Risk | Operation phase residual effects of the Onshore $CO_2$ Pipeline will be mostly limited to minor adverse associated with the loss of riparian vegetation in watercourses, watercourse hydrology and hydromorphological processes, groundwater levels and flow and groundwater quality. The effects on the hydrology and hydromorphological processes of Alltami Brook and the effects of the installation of permanent artificial structures in watercourses are anticipated to be slight adverse (not significant).<br>Effects of the $CO_2$ Pipeline in the vicinity of the Hydrogen Pipeline are limited to minor adverse due to modifications to hydromorphology from cutting of watercourses. As the Hydrogen Pipeline is similar in nature and overlapping in location in the vicinity of Section 1, the residual effects are likely to be similar. | As these effects would be on the same receptors, a magnification of effects is likely to occur on watercourses in the vicinity of Stanlow and Ince AGIs. This effect is not anticipated to be significant as the linear nature of the development will not result in concentrated adverse effects on watercourses from permanent cutting of these watercourses. Therefore, a minor adverse effect is anticipated. |

12.1.8. In summary, no significant inter-project effects are anticipated between the offshore Proposed Development, and the Point of Ayr Terminal, the Onshore Carbon Dioxide Transportation Pipeline, the Protos, Runcorn, and Padeswood Carbon Dioxide Spur Pipelines, and the HyNet North West Hydrogen Pipeline.

# 13. CONCLUSION

13.1.1. The HyNet North West Project is a low carbon energy project made up of several different elements which combined will provide the infrastructure to produce, transport and store low carbon hydrogen across the North West and North Wales. It also includes the infrastructure to capture, transport and lock away $CO_2$ emissions from industry.

13.1.2. The HyNet North West Project will both upgrade existing infrastructure as well as develop new infrastructure including underground pipelines, hydrogen production plants and storage facilities. These schemes have been separated into several discrete projects based on their consenting/licensing requirements and are currently at various stages in the consenting process.

13.1.3. However, as these schemes form one part of a multi-component project, the environmental effects of all project components need to be considered. The purpose of this report has been to summarise the environmental effects of the relevant schemes, to give an overview of the combined environmental effects and aid the decision-making process. More detailed information on HyNet is contained within the relevant consent/licensing applications.

13.1.4. The following schemes have been summarised within this report:

- Offshore $CO_2$ Transport and Storage Marine License (CML2365) and Storage Permit (ES/2022/009) applications;
- Point of Ayr Terminal Town and Country Planning Application (TCPA Ref: FUL/000246/23);
- Onshore Carbon Dioxide Pipeline Development Consent Order (PINS Ref: EN070007);
- Trenchless Crossing of the River Dee Marine License (Ref: CML2350);
- Protos Carbon Dioxide Spur Pipeline (TCPA Ref: 24/00777/FUL)
- Runcorn Carbon Dioxide Pipeline EIA (TCPA Ref 24/08037/PREAPP);
- Padeswood Carbon Dioxide Spur Pipeline EIA (TCPA Ref 24/08037/PREAPP); and
- HyNet North West Hydrogen Pipeline Development Consent Order (PINS Ref: EN060006).

13.1.5. The Environmental Statements prepared to support the Carbon Dioxide Pipeline (including the HDD Pipeline underneath the River Dee) and PoA Terminal Schemes provide a comprehensive assessment of the likely significant effects which would result from installation, operation (including repair and maintenance) and decommissioning. The proposed route of the pipelines has been carefully selected to minimise environmental effects and mitigation measures embedded into the design. Where these measures were not sufficient to fully mitigate any

significant environmental effects, additional specific mitigation measures have been identified.

13.1.6. A PEIR has been produced for the HyNet North West Hydrogen Pipeline, project as this project is at an early stage in the consenting process. An ES will also be prepared for this scheme in due course, following completion of the Statutory Consultation, and submission of the DCO application.

13.1.7. A Scoping Report has been prepared for each of Runcorn, and Padeswood Carbon Dioxide Spur Pipeline projects. An ES will be prepared for both developments in due course.

13.1.8. A TCPA was submitted for the Protos Development, which did not require an EIA, but instead was supported by several environmental studies.

13.1.9. Table 13-1 presents a summary of the environmental assessment conclusions from the assessments carried out for the various HyNet Project components.

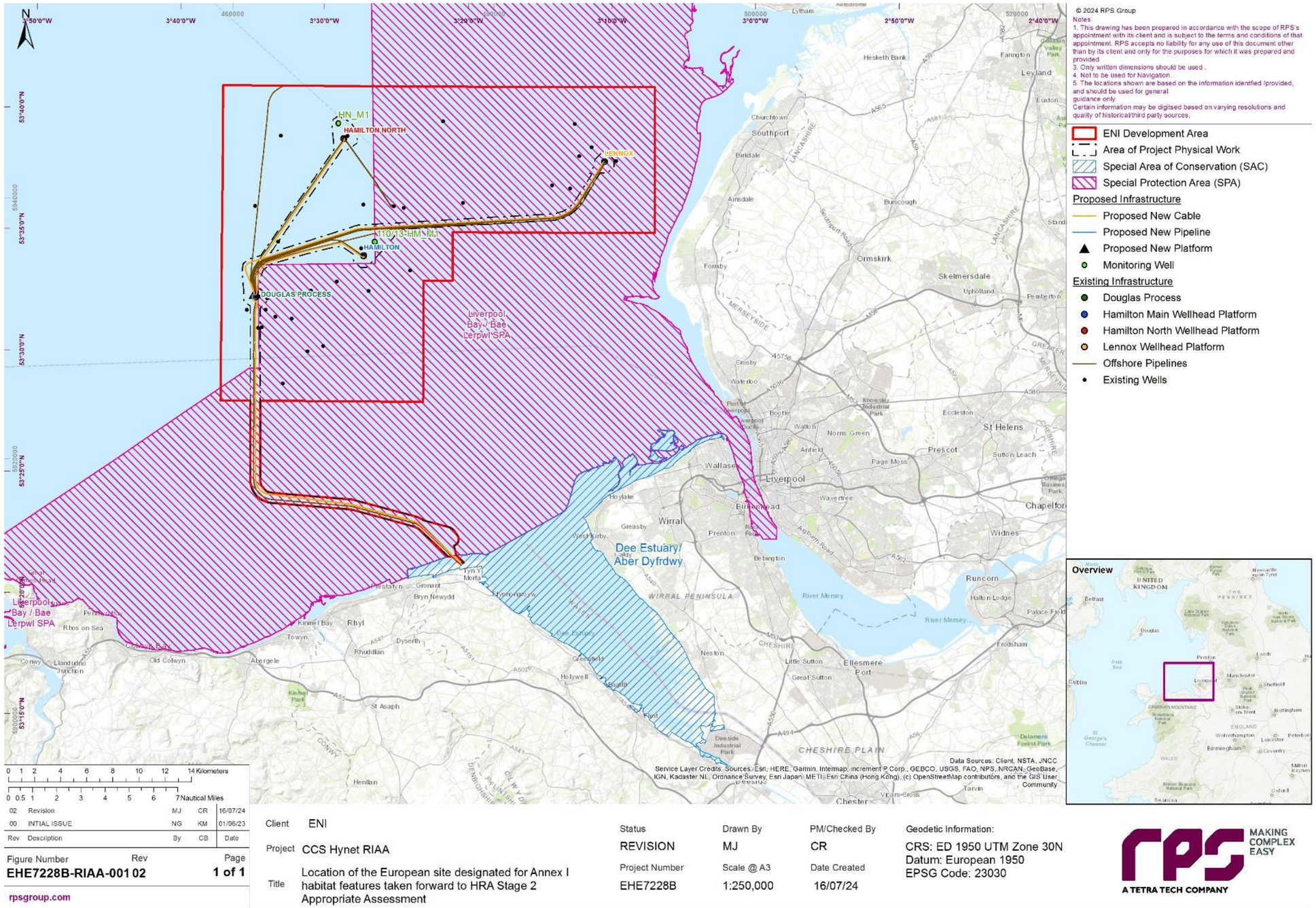
## Table 13-1 – Summary of Environmental Assessment Conclusions

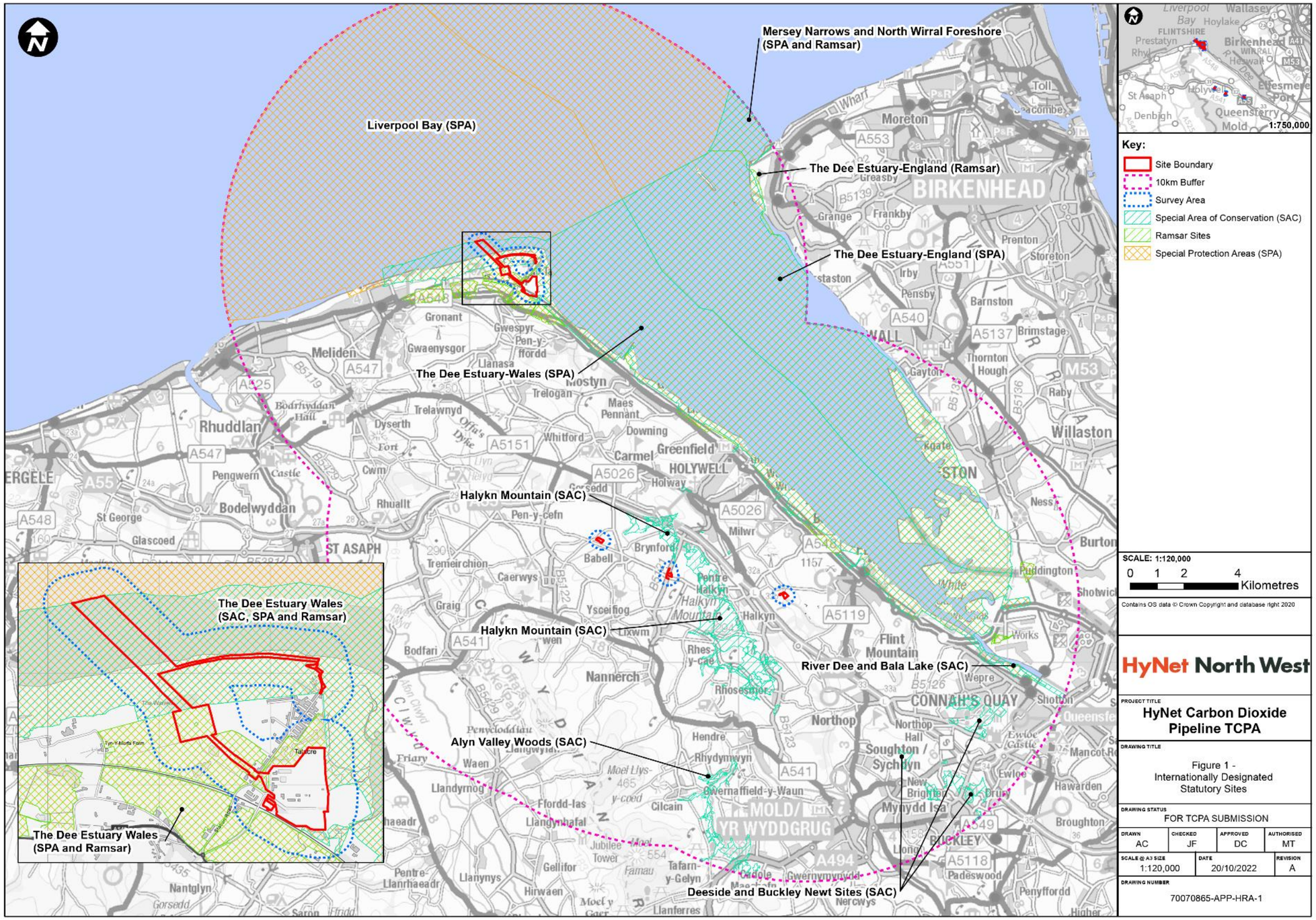
| Topic | Onshore $CO_2$ Pipeline | River Dee Crossing | PoA | Hydrogen Production | Protos | Runcorn | Padeswood | Offshore $CO_2$ Transport and Storage |
|---|---|---|---|---|---|---|---|---|
| Air Quality | Not Significant | Scoped Out | Not Significant | No significant effects were identified but will be confirmed in the ES | Not Significant | Effects will be determined within the ES | Effects will be determined within the ES | Scoped Out |
| Climate Resilience | Not Significant | Scoped Out | Not Significant | No significant effects were identified but will be confirmed in the ES | Scoped Out | Effects will be determined within the ES | Effects will be determined within the ES | Not Applicable |
| Cultural Heritage | Moderate Adverse Significant Effect | Not Significant | Not Significant | No significant effects were identified but will be confirmed in the ES. | Further assessment required to determine the effect. | Effects will be determined within the ES | Effects will be determined within the ES | Not Significant |
| Biodiversity | Not Significant | Not Significant | Not Significant | No significant effects were identified but will be confirmed in the ES | Not Significant | Effects will be determined within the ES | Effects will be determined within the ES | Not Significant |
| Greenhouse Gases | Beneficial Significant Effect | Scoped Out | Moderate Adverse Significant Effect Beneficial Significant Effect | No significant effects were identified but will be confirmed in the ES | Scoped Out | Effects will be determined within the ES | Effects will be determined within the ES | Moderate Adverse Effect during construction |
| Land and Soils | Not Significant | Scoped Out | Not Significant | A significant permanent effect is anticipated on peat. This will be confirmed within the ES | Scoped Out | Effects will be determined within the ES | Effects will be determined within the ES | Not Applicable |
| Landscape and Visual | Moderate Adverse Significant Effect | Scoped Out | Moderate Adverse Significant Effect | No significant effects were identified but will be confirmed in the ES | Mitigation will be used to limit visual impacts on nearby receptors. | Effects will be determined within the ES | Effects will be determined within the ES | Not Significant |
| Major Accidents and Disasters | As Low As Reasonably Practicable | Scoped Out | As Low As Reasonably Practicable | No Significant Effects were identified but will be confirmed in the ES | Scoped Out | Effects will be | Effects will be determined within the ES | Scoped out |

| Topic | Onshore $CO_2$ Pipeline | River Dee Crossing | PoA | Hydrogen Production | Protos | Runcorn | Padeswood | Offshore $CO_2$ Transport and Storage |
|---|---|---|---|---|---|---|---|---|
| | | | | | | determined within the ES | | |
| Materials and Waste | Not Significant | Scoped Out | Not Significant | Scoped Out | Scoped Out | Scoped Out | Scoped Out | Not Significant |
| Noise and Vibration | Significant Adverse Effect | Scoped Out | Significant Adverse Effect | No Significant Effects were identified but will be confirmed in the ES | Not Significant | Effects will be determined within the ES | Effects will be determined within the ES | Not Applicable |
| Population and Human Health | Moderate Adverse Significant Effect | Scoped Out | Not Significant | Scoped Out | Scoped Out | Effects will be determined within the ES | Effects will be determined within the ES | Not Significant |
| Traffic and Transport | Not Significant | Scoped Out | Not Significant | No Significant Effects were identified but will be confirmed in the ES | Not Significant with mitigation in place | Effects will be determined within the ES | Effects will be determined within the ES | Not applicable |
| Water Resources and Flood Risk | Moderate Adverse Significant Effect | Scoped Out | Not Significant | No Significant | Not Significant with mitigation in place | Effects will be determined within the ES | Effects will be determined within the ES | Not applicable |
| Land Use | Scoped Out | Scoped Out | Scoped Out | No Significant Effects were identified but will be confirmed in the ES | Scoped Out | Scoped Out | Scoped Out | Not applicable |
| Ground Conditions | Scoped Out | Scoped Out | Scoped Out | No Significant Effects were identified but will be confirmed in the ES | Scoped Out | Scoped Out | Scoped Out | Not Applicable |
| People and Communities | Scoped Out | Scoped Out | Scoped Out | No Significant Effects were identified but will be confirmed in the ES | Scoped Out | Scoped Out | Scoped Out | Not Significant |
| Combined and Cumulative Effects | Not Significant | Not Significant | Not Significant | Further details will be assessed within the ES | Scoped Out | Effects will be determined within the ES | Effects will be determined within the ES | Not Significant |

# Annex A

## MAPS OF EUROPEAN SITES ACROSS HYNET NORTH WEST PROJECTS


HN_M1
HAMILTON NORTH
LENNOX
X10/13-HM_M1
HAMILTON
DOUGLAS PROCESS
Liverpool Bay / Bae Lerpwl SPA
Dee Estuary / Aber Dyfrdwy
WIRRAL PENINSULA
CHESHIRE PLAIN
Liverpool Bay / Bae Lerpwl SPA
Overview
© 2024 RPS Group
Notes
1. This drawing has been prepared in accordance with the scope of RPS's appointment with its client and is subject to the terms and conditions of that appointment. RPS accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided.
3. Only written dimensions should be used .
4. Not to be used for Navigation.
5. The locations shown are based on the information identfied /provided, and should be used for general guidance only.
Certain information may be digitsed based on varying resolutions and quality of historical/third party sources.
ENI Development Area
Area of Project Physical Work
Special Area of Conservation (SAC)
Special Protection Area (SPA)
Proposed Infrastructure
Proposed New Cable
Proposed New Pipeline
Proposed New Platform
Monitoring Well
Existing Infrastructure
Douglas Process
Hamilton Main Wellhead Platform
Hamilton North Wellhead Platform
Lennox Wellhead Platform
Offshore Pipelines
Existing Wells
Data Sources: Client, NSTA, JNCC
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
0 1 2 4 6 8 10 12 14 Kilometers
0 0.5 1 2 3 4 5 6 7 Nautical Miles
02 Revision MJ CR 16/07/24
00 INTIAL ISSUE NG KM 01/06/23
Rev Description By CB Date
Figure Number EHE7228B-RIAA-001 02
Rev 02
Page 1 of 1
rpsgroup.com
Client ENI
Project CCS Hynet RIAA
Title Location of the European site designated for Annex I habitat features taken forward to HRA Stage 2 Appropriate Assessment
Status REVISION
Drawn By MJ
PM/Checked By CR
Project Number EHE7228B
Scale @ A3 1:250,000
Date Created 16/07/24
Geodetic Information:
CRS: ED 1950 UTM Zone 30N
Datum: European 1950
EPSG Code: 23030
MAKING COMPLEX EASY
A TETRA TECH COMPANY


Mersey Narrows and North Wirral Foreshore (SPA and Ramsar)
Liverpool Bay (SPA)
The Dee Estuary-England (Ramsar)
The Dee Estuary-England (SPA)
The Dee Estuary-Wales (SPA)
Halykn Mountain (SAC)
Halykn Mountain (SAC)
River Dee and Bala Lake (SAC)
Alyn Valley Woods (SAC)
Deeside and Buckley Newt Sites (SAC)
The Dee Estuary Wales (SAC, SPA and Ramsar)
The Dee Estuary Wales (SPA and Ramsar)
BIRKENHEAD
WALL
HOLYWELL
MOLD/ YR WYDDGRUG
CONNAH'S QUAY
Key:
Site Boundary
10km Buffer
Survey Area
Special Area of Conservation (SAC)
Ramsar Sites
Special Protection Areas (SPA)
1:750,000
SCALE: 1:120,000
0 1 2 4 Kilometres
Contains OS data © Crown Copyright and database right 2020
HyNet North West
PROJECT TITLE
HyNet Carbon Dioxide Pipeline TCPA
DRAWING TITLE
Figure 1 - Internationally Designated Statutory Sites
DRAWING STATUS
FOR TCPA SUBMISSION
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CHECKED JF
APPROVED DC
AUTHORISED MT
SCALE @ A3 SIZE 1:120,000
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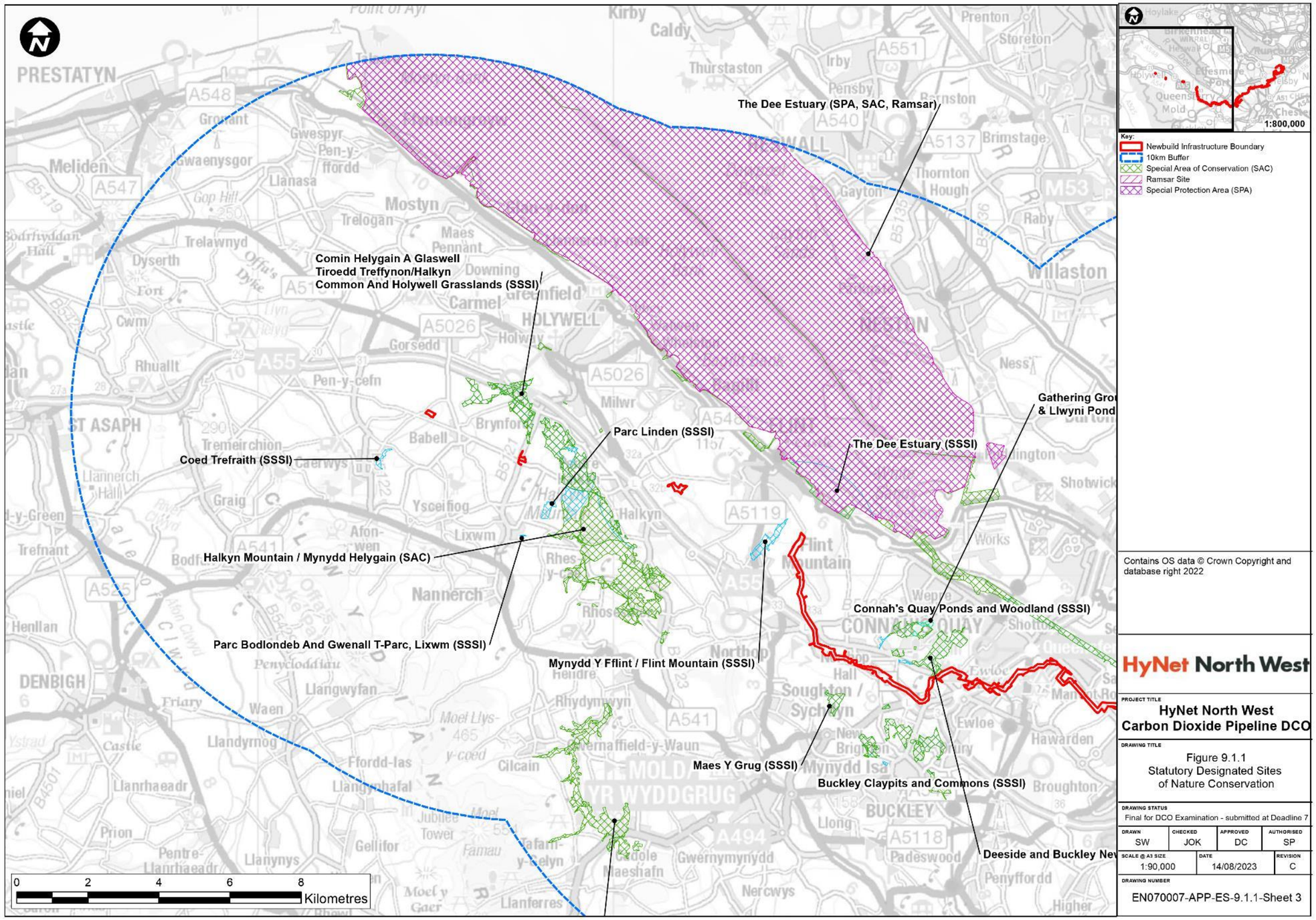
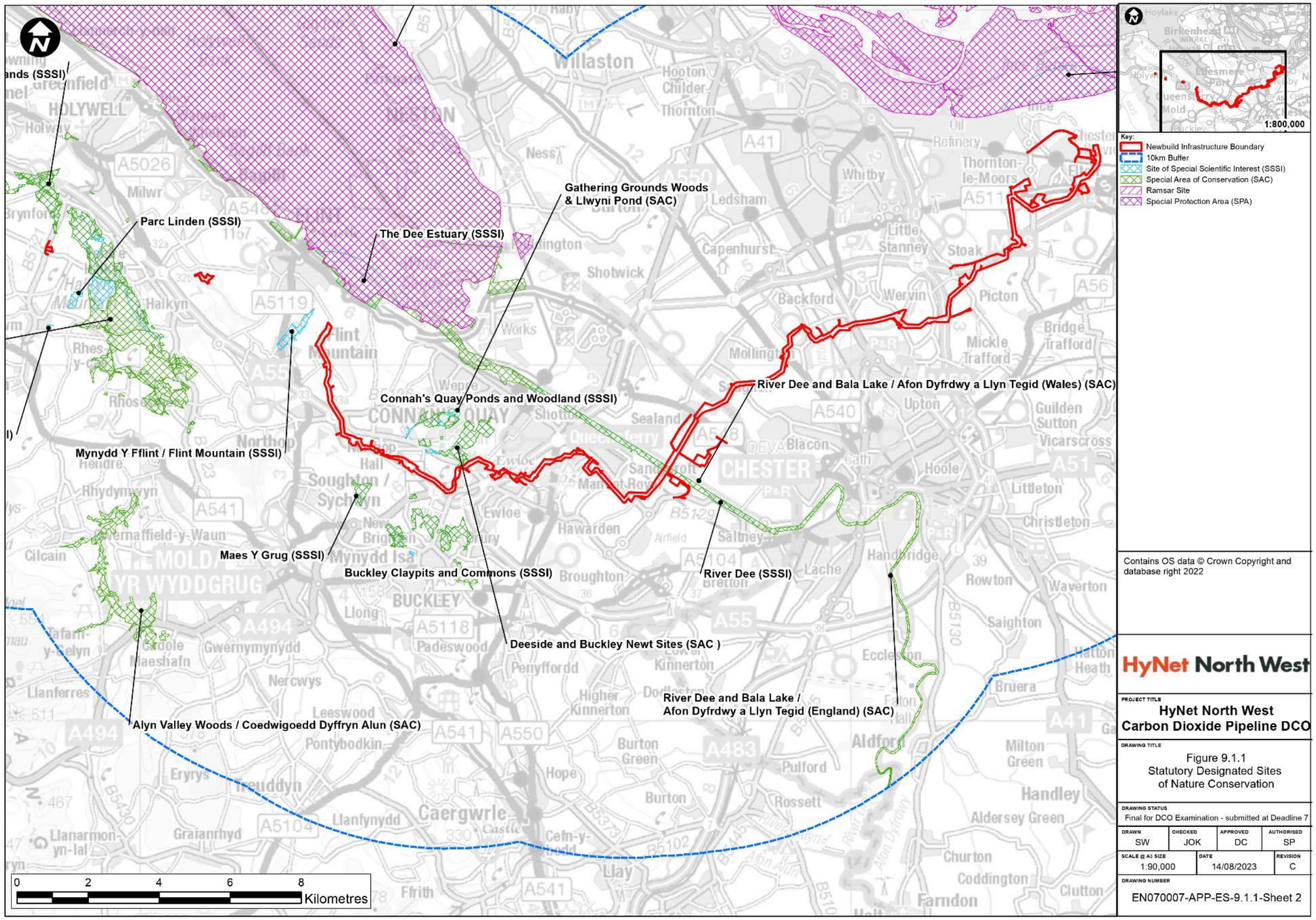
REVISION A
DRAWING NUMBER
70070865-APP-HRA-1

# ONSHORE CARBON DIOXIDE TRANSPORTATION PIPELINE




Parc Linden (SSSI)
The Dee Estuary (SSSI)
Gathering Grounds Woods
& Llwyni Pond (SAC)
River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid (Wales) (SAC)
Connah's Quay Ponds and Woodland (SSSI)
Mynydd Y Fflint / Flint Mountain (SSSI)
Maes Y Grug (SSSI)
Buckley Claypits and Commons (SSSI)
River Dee (SSSI)
Deeside and Buckley Newt Sites (SAC )
River Dee and Bala Lake /
Afon Dyfrdwy a Llyn Tegid (England) (SAC)
Alyn Valley Woods / Coedwigoedd Dyffryn Alun (SAC)
0 2 4 6 8
Kilometres
1:800,000
Key:
Newbuild Infrastructure Boundary
10km Buffer
Site of Special Scientific Interest (SSSI)
Special Area of Conservation (SAC)
Ramsar Site
Special Protection Area (SPA)
Contains OS data © Crown Copyright and database right 2022
HyNet North West
PROJECT TITLE
HyNet North West
Carbon Dioxide Pipeline DCO
DRAWING TITLE
Figure 9.1.1
Statutory Designated Sites
of Nature Conservation
DRAWING STATUS
Final for DCO Examination - submitted at Deadline 7
DRAWN SW
CHECKED JOK
APPROVED DC
AUTHORISED SP
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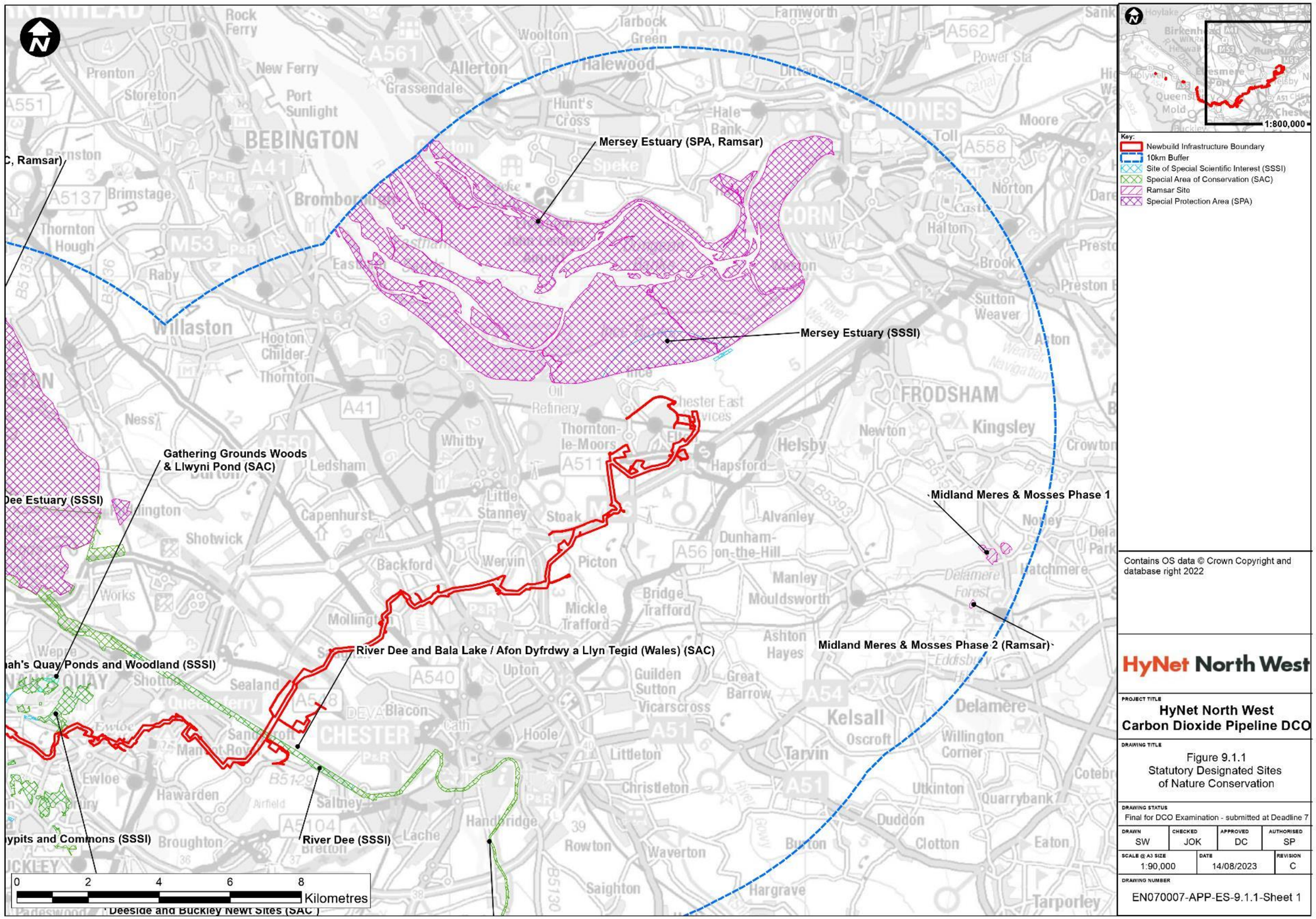
DATE 14/08/2023
REVISION C
DRAWING NUMBER
EN070007-APP-ES-9.1.1-Sheet 2


Mersey Estuary (SPA, Ramsar)
Mersey Estuary (SSSI)
Midland Meres & Mosses Phase 1
Midland Meres & Mosses Phase 2 (Ramsar)
Gathering Grounds Woods & Llwyni Pond (SAC)
River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid (Wales) (SAC)
River Dee (SSSI)
Deeside and Buckley Newt Sites (SAC)
0 2 4 6 8 Kilometres
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Key:
Newbuild Infrastructure Boundary
10km Buffer
Site of Special Scientific Interest (SSSI)
Special Area of Conservation (SAC)
Ramsar Site
Special Protection Area (SPA)
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HyNet North West
PROJECT TITLE
HyNet North West Carbon Dioxide Pipeline DCO
DRAWING TITLE
Figure 9.1.1
Statutory Designated Sites of Nature Conservation
DRAWING STATUS
Final for DCO Examination - submitted at Deadline 7
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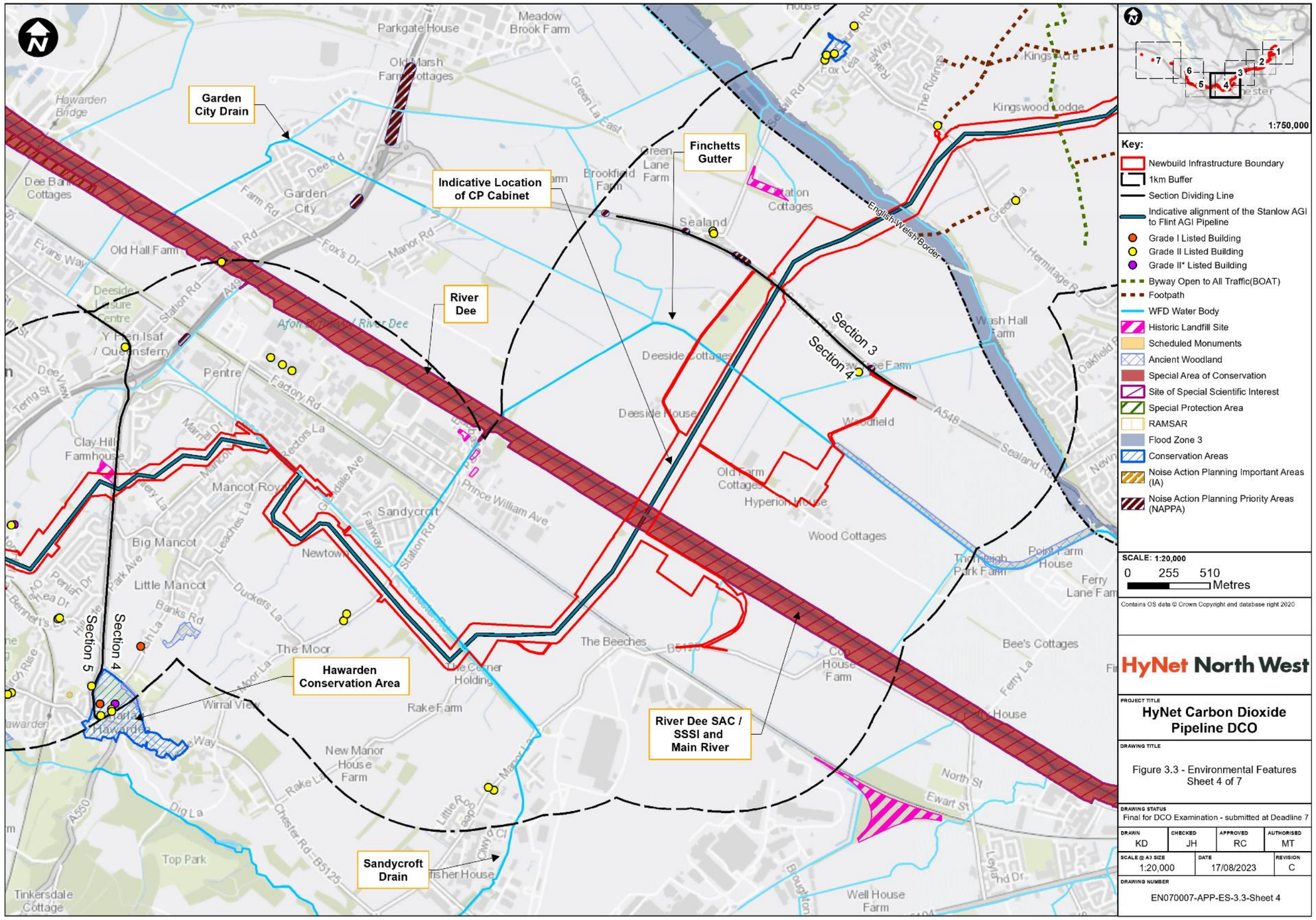
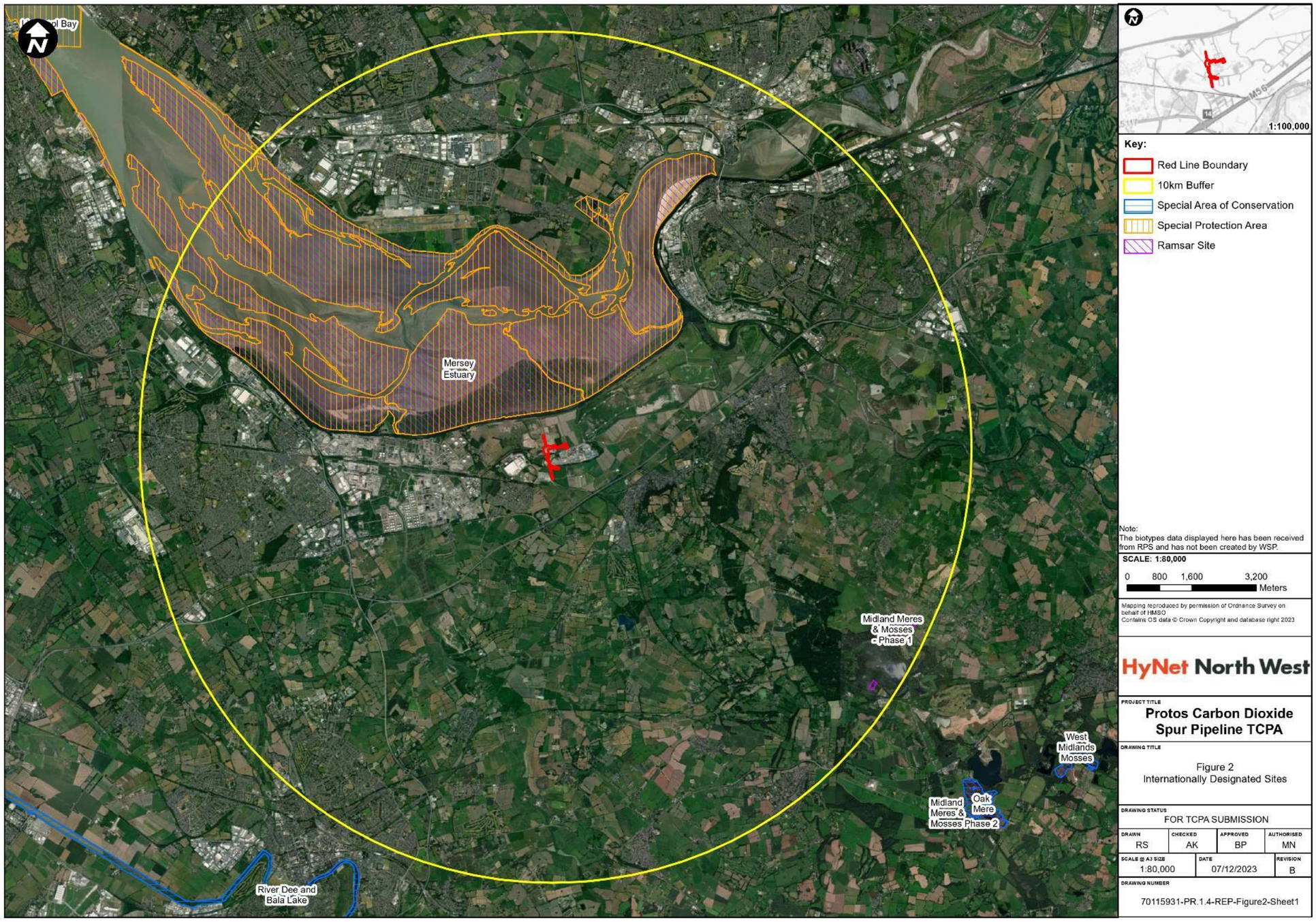
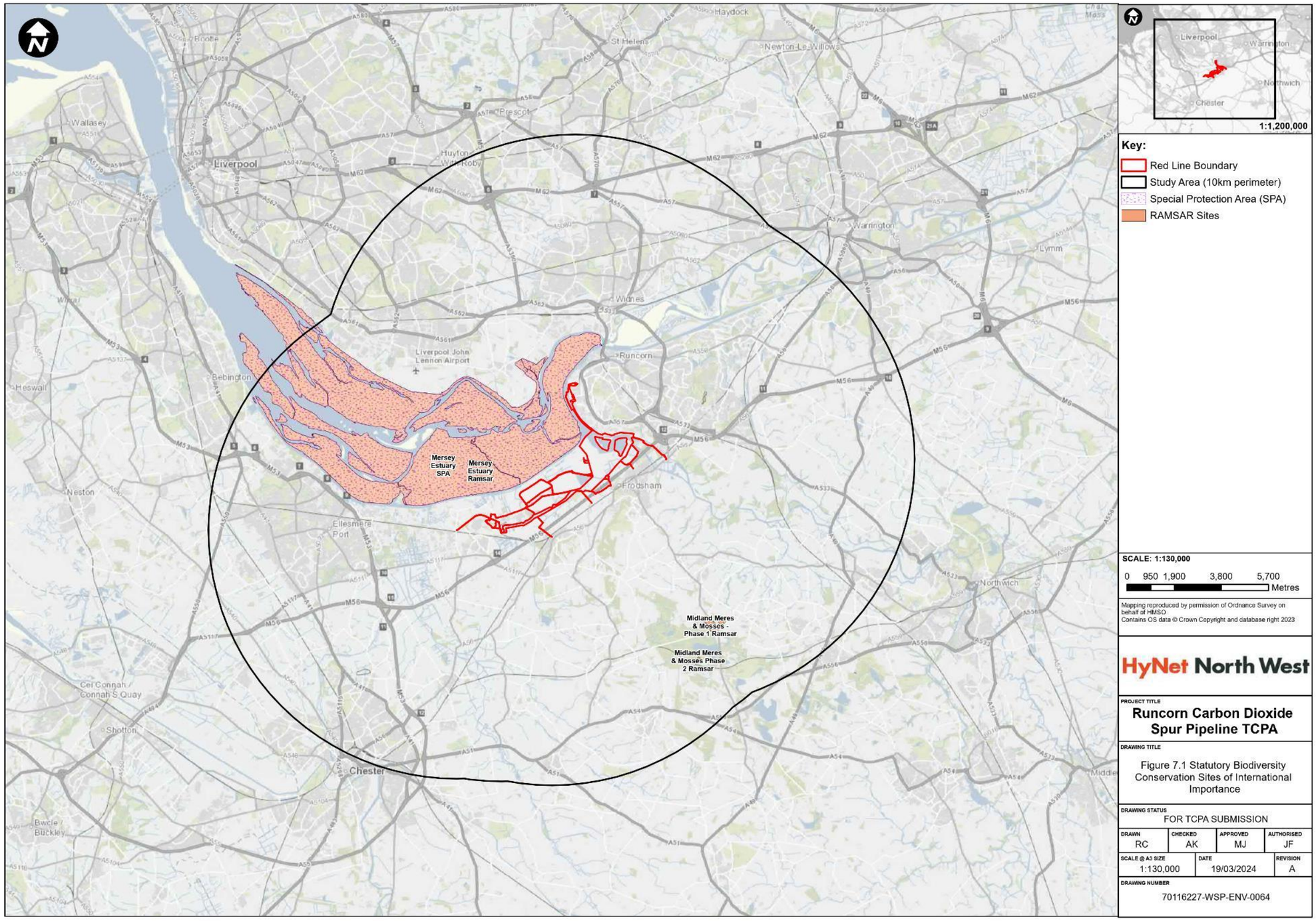
# TRENCHLESS CROSSING OF THE RIVER DEE



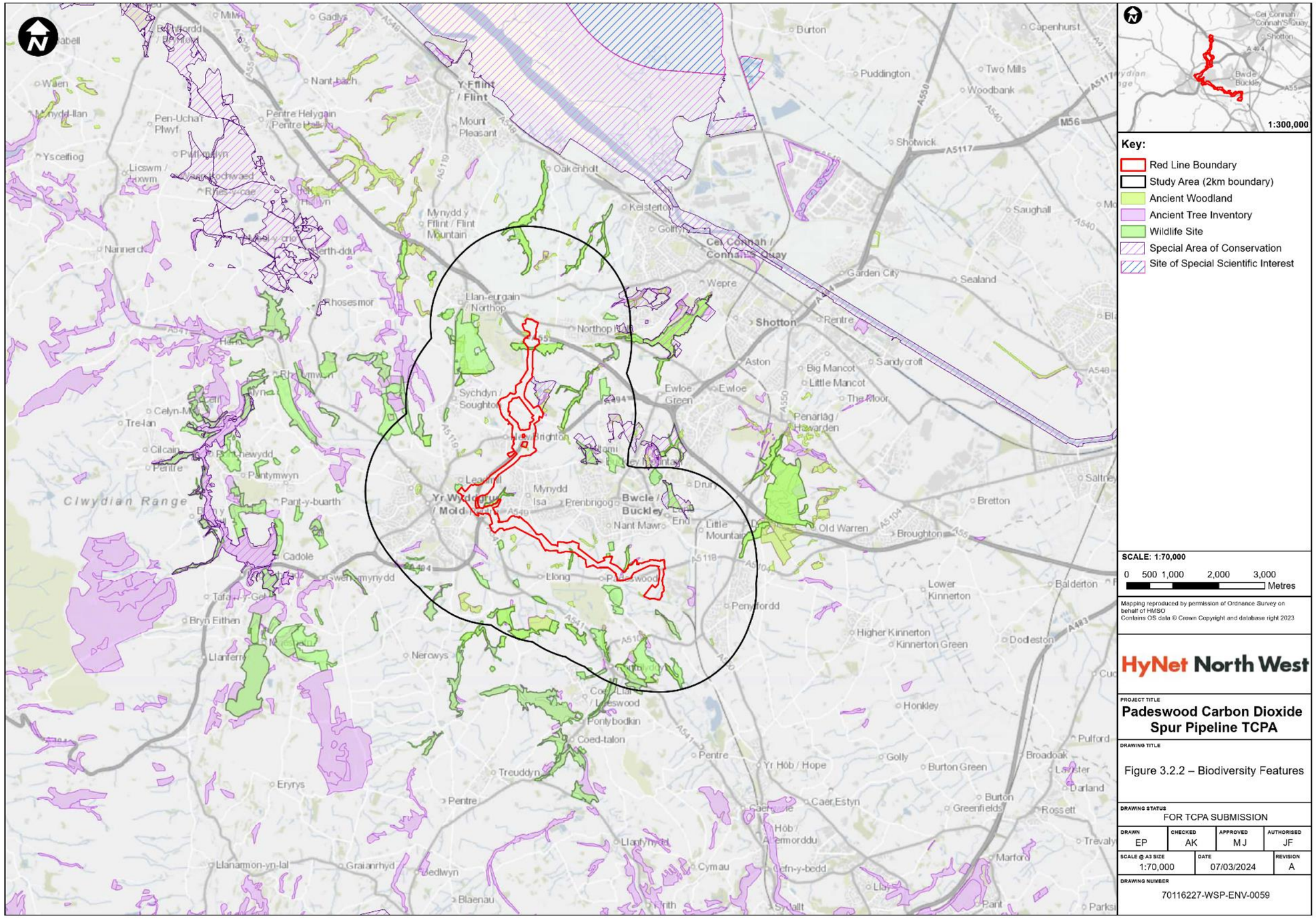
# PROTOS CARBON DIOXIDE SPUR PIPELINE

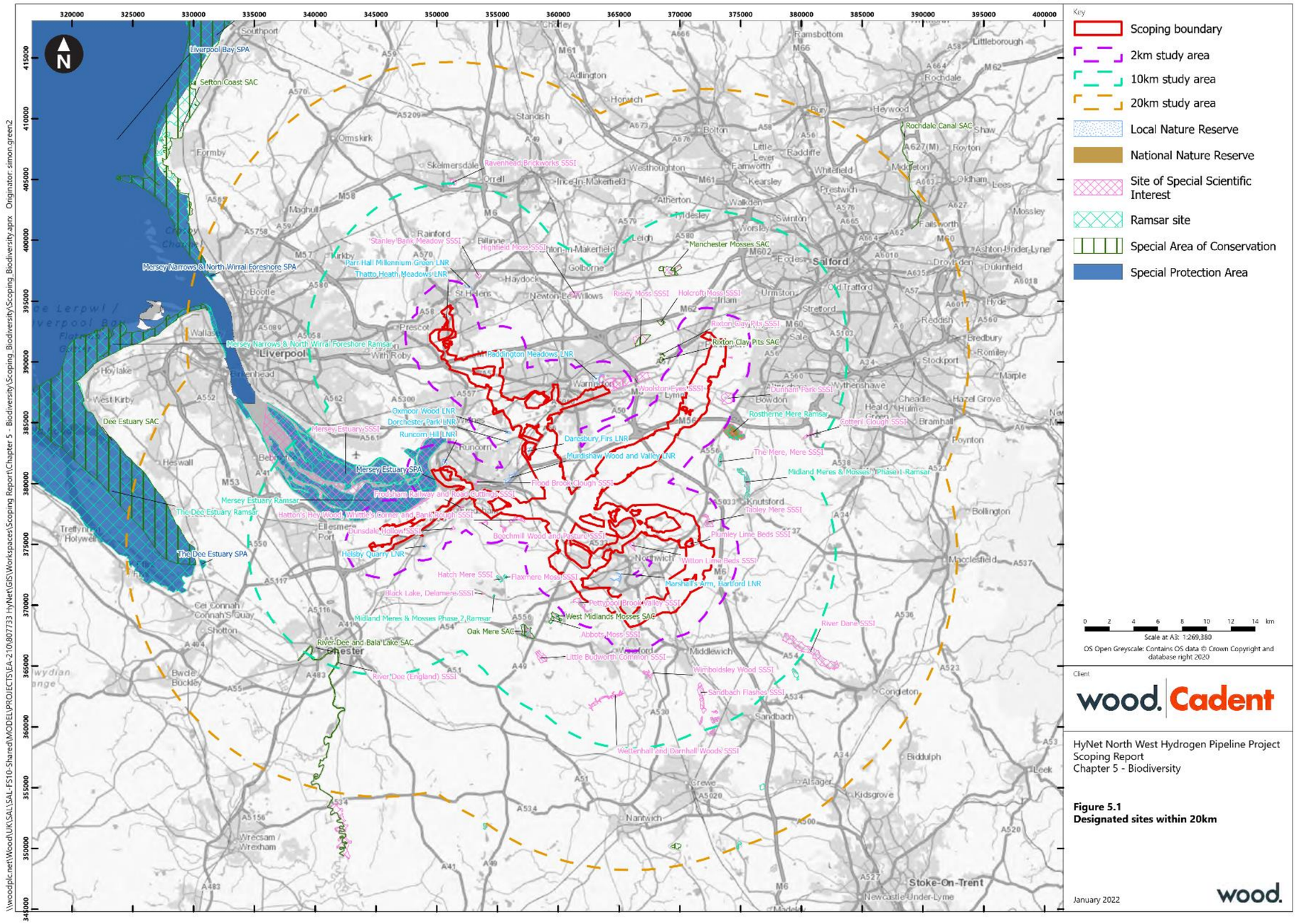


# RUNCORN CARBON DIOXIDE SPUR PIPELINE



# PADESWOOD CARBON DIOXIDE PIPELINE






Source: WOOD/Cadent - HyNet North West Hydrogen Pipeline Project Scoping Report