HyNet North West

ENVIRONMENTAL STATEMENT (VOLUME II) (Tracked)

Chapter 3 – Description of the DCO Proposed Development

HyNet Carbon Dioxide Pipeline DCO

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 - Regulations 5(2)(a)

Document Reference Number D.6.2.3.

Applicant: Liverpool Bay CCS Limited

Inspectorate Reference: EN070007

English Version

REVISION: ~~01~~B

DATE: June 2023

DOCUMENT OWNER: WSP UK Ltd

PUBLIC

QUALITY CONTROL

Document Reference		D.6.2.3		
Document Owner		WSP		
Revision	Date	Comments	Author	Approver
A	September 2022	Submitted with DCO application	RC	CL
B	June 2023	Updated for design change request 1 & 2	RC	MT

TABLE OF CONTENTS

FIGURES / DIAGRAMS

TABLES

3. DESCRIPTION OF THE DCO PROPOSED DEVELOPMENT

3.1. INTRODUCTION

3.1.1. This Chapter provides a description of the Development Consent Order (DCO) Proposed Development for the purposes of identifying and reporting the potential environmental impacts and likely significant effects in this Environmental Statement (ES).

3.1.2. The DCO Proposed Development has been updated following Statutory Consultation on the **Preliminary Environmental Impact Report (PEIR) (Document reference: D.0.9).** The description of the DCO Proposed Development within this Chapter represents the Preliminary Design, design parameters and Limits of Deviation (LoD) for which consent is sought.

3.1.3. In order to ensure a robust assessment of the likely significant environmental effects of the DCO Proposed Development, the Environmental Impact Assessment (EIA) has been undertaken adopting the principles of the 'Rochdale Envelope' approach where appropriate. This involves assessing the maximum (or where relevant, minimum) design parameters for the elements where reasonable flexibility needs to be retained at this stage of design development. Where this approach is being applied in the EIA, this is confirmed within the relevant Chapters of this ES. Any indicative alignment of the Newbuild Carbon Dioxide Pipeline shown in the ES is there to inform the assessment and is not representative of the Detailed Design.

3.1.4. Justification for the need to retain reasonable design flexibility at the Preliminary Design stage is also outlined in this Chapter and in **Chapter 4 - Assessment of Alternatives (Volume II)**. As such, this ES represents a reasonable worst-case assessment of the potential impacts of the DCO Proposed Development.

3.1.5. The environmental assessment area considered in this ES is defined by the Order Limits as shown in **Figure 3-1 DCO Proposed Development Boundaries (Volume IV).** However, for those topics which have scoped out the section of existing Connah's Quay to Point of Ayr (PoA) Terminal Pipeline (referred to in this ES as the Flint Connection to PoA Terminal Pipeline), the environmental assessment area considered in this ES is the Newbuild Infrastructure Boundary. The Newbuild Infrastructure Boundary includes the maximum extent of all potential permanent and temporary construction works required as part of the DCO Proposed Development.

3.1.6. The key terms referred to in this ES to support the description of the DCO Proposed Development are defined in the **Glossary (Document Reference D.1.7)**.

3.2. KEY ELEMENTS OF THE DCO PROPOSED DEVELOPMENT

3.2.1. The DCO Application will seek consent for the following key elements which form part of the DCO Proposed Development:

- **Ince Above Ground Installation (AGI) to Stanlow AGI Pipeline**– an approximate 4 km section of underground onshore pipeline (20" in diameter with capacity of up to 2.5 $MtCO_2/yr$ at a pressure of approximately 38 barg) to transport CO_2 **(Work Numbers 4, 5, 6, 7)**;
- **Stanlow AGI to Flint AGI Pipeline** – an approximate 32 km section of underground onshore pipeline (36" in diameter with a capacity of up to 10 $MtCO_2/yr$ at a pressure of approximately 35 barg) to transport CO_2 **(Work Numbers 7, 11, 12, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 28, 29, 30, 31, 32, 33, 34, 35, 38, 39, 40, 41, 42, 43, 44, 47)**;
- **Flint AGI to Flint Connection Pipeline** – an approximate 400m section of underground onshore tie-in pipe (24" in diameter with a capacity of up to 4.5 $MtCO_2/yr$ at a pressure of approximately 33 barg) to transport CO_2 **(Work Number 50)**;
- **Flint Connection to Point of Ayr (PoA) Terminal Pipeline** – an approximate 24 km section of existing underground onshore pipeline (24" in diameter) between Connah's Quay and PoA Terminal which currently transports natural gas but would be repurposed and reused to transport CO_2. This section of the Connah's Quay to PoA Pipeline is referred to in this ES as the Flint Connection to PoA Terminal Pipeline. Construction along the Flint Connection to PoA Terminal Pipeline will be limited to works associated with connecting it to:
    - the Flint AGI to Flint Connection Pipeline (included within the scope of this EIA) **(Work Number 50)**,
    - the three Block Valve Stations (BVSs) via installation of small sections of Tie-In pipeline (Included within the scope of this EIA) **(Work Numbers 51, 53, 55)**; and
    - the PoA Terminal (subject to approval of the TCPA Proposed Development so are not included within the scope of this EIA but assessed in **Chapter 19 – Combined and Cumulative Assessment (Volume II)**).

Where no construction works are proposed along the Flint Connection to PoA Terminal Pipeline, it is not included within the Newbuild Infrastructure Boundary for further details refer to **Chapter 5 – EIA Methodology (Volume II)**.

- **Four AGIs** – Ince AGI **(Work Number 1)**, Stanlow AGI **(Work Number 9)**, Northop Hall AGI **(Work Number 45)**, and Flint AGI **(Work Number 48)**;
- **Six BVSs** – located along:
  - the Stanlow AGI to Flint AGI Pipeline (three in total, **Work Numbers 20, 26, 36**); and
  - the Flint Connection to PoA Terminal Pipeline (three in total, **Work Numbers 51, 53, 55**);
- **Embedded Pipe Bridge** – where the Stanlow AGI to Flint AGI Pipeline crosses Alltami Brook (Work Number 43E).
- **Other above ground infrastructure**, including Cathodic Protection (CP) transformer rectifier cabinets, CP test posts and pipeline marker posts (included as works within the relevant AGI and pipeline works descriptions in the DCO);
- **Utility Connection infrastructure**, including power utilities and Fibre Optic Cable (FOC) (included as works within the relevant AGI, BVS and pipeline works descriptions in the DCO); and
- **Temporary works** integral to the construction of the DCO Proposed Development, including Construction Compounds and temporary access tracks.

3.2.2. Further details of each key element of the DCO Proposed Development are set out in **Sections 3.4** and **3.5**. The EIA has assessed the construction, operation and decommissioning of the DCO Proposed Development. Any mitigation areas proposed for landscape or ecology are shown in **Figure 3.4 – Landscape and Ecological Mitigation Plan (Volume IV).**

3.2.3. Construction of the DCO Proposed Development is detailed in **Section 3.6**. This includes information on anticipated construction programme, timings and methods of working.

3.2.4. Operation and Maintenance of the DCO Proposed Development is detailed in **Section 3.7**. This includes information on operating and routine maintenance procedures, permanent rights required, lighting and employment.

3.2.5. Decommissioning of the DCO Proposed Development is detailed in **Section 3.8**.

3.2.6. This chapter is supported by **Figures 3.1 – 3.4 (Volume IV)**.

3.3. NEWBUILD CARBON DIOXIDE PIPELINE

OVERVIEW

3.3.1. As presented in **Section 3.2**, there are three sections of the Newbuild Carbon Dioxide Pipeline which form part of the DCO Proposed Development:

- Ince AGI to Stanlow AGI Pipeline;
- Stanlow AGI to Flint AGI Pipeline; and
- Flint AGI to Flint Connection Pipeline.

3.3.2. The Newbuild Carbon Dioxide Pipeline will connect to upstream emitters, in order to transport their captured CO_2.

3.3.3. The DCO Proposed Development will enable the three sections of Newbuild Carbon Dioxide Pipeline, in conjunction with the repurposed Flint Connection to PoA Terminal Pipeline, to carry approximately 4.5 $MtCO_2/yr$ of CO_2. The Newbuild Carbon Dioxide Pipeline has a design life of 40 years.

3.3.4. The Newbuild Carbon Dioxide Pipeline will be built out of steel and to BS PD8010-1 Pipeline Systems (**Ref. 3-1**) and buried underground along its entire length, except for short sections within the AGIs. The depth from the top/crown of the pipe to the ground surface would vary and depend upon technical factors such as ground conditions, topography and the length of the pipe section. However, the buried depth would be a minimum of 1.2 m to the crown of the pipe in open cut sections and deeper for trenchless crossings to avoid existing services and physical obstructions. The open cut trench will be between approximately 2.5 m and 6 m deep to enable pipeline installation.

3.3.5. Open-cut trenching methods will be used for the majority of the Newbuild Carbon Dioxide Pipeline. For complex crossings, to avoid disruption to utilities, major highways, railways, watercourses and/or particular environmental sensitivities e.g. ancient woodland, specialist trenchless installation techniques would be used (**D-PD-001** of the **Register of Environmental Actions and Commitments (REAC), Document reference: D.6.5.1**)).

3.3.6. Further detail on these construction methods is provided in **Section 3.6**.

THE NEWBUILD CARBON DIOXIDE PIPELINE ROUTE

3.3.7. The route of the Newbuild Carbon Dioxide Pipeline and location/design of above ground infrastructure has been informed by various factors including environmental sensitivities. The route has

been refined following liaison with stakeholders, including statutory bodies, individuals, communities, landowners and occupiers and local authorities to understand the impact of the DCO Proposed Development, as well as working with engineering and environmental experts.

3.3.8. The final route of the Newbuild Carbon Dioxide Pipeline will be confirmed at Detailed Design stage. For the purposes of the ES, in order to ensure a reasonable worst case has been assessed, it has been assumed that the Newbuild Carbon Dioxide Pipeline could be installed anywhere within the "Permanent Acquisition of Subsurface" area as marked in pink on **Figure 3.2 - DCO Proposed Development (Volume IV)**, unless there is a commitment or requirement that places restrictions on its precise location.

~~3.3.8. The final route of the Newbuild Carbon Dioxide Pipeline will be confirmed at Detailed Design stage. For the purposes of the ES to ensure a worst case has been assessed, it has been assumed that the Newbuild Carbon Dioxide Pipeline could be installed anywhere within the "Permanent Acquisition of Subsurface" area as marked in pink on **Figure 3.2 - DCO Proposed Development (Volume IV)**.~~

3.3.9. To aid the design of the DCO Proposed Development and the reporting of potential environmental impacts, the DCO Proposed Development reported in this ES has been separated into six geographical sections (Sections 1 – 6). The six sections are shown on **Figure 3.2 – DCO Proposed Development (Volume IV)** and are described below.

Section 1

Summary of Section

3.3.10. Section 1 is located entirely within the Cheshire West and Chester local authority boundary, and spans three Parish Council boundaries (Ince, Elton and Thornton-le-Moors), predominately lying within the Elton Parish Council boundary.

3.3.11. Section 1 includes the Ince AGI, located south west of the CF Fertiliser Plant off Marsh Lane, and the Stanlow AGI, located within the existing Stanlow Manufacturing Complex. Section 1 captures the entire Ince AGI to Stanlow AGI Pipeline and the start of the Stanlow AGI to Flint AGI Pipeline.

3.3.12. Section 1 of the Newbuild Carbon Dioxide Pipeline is shown on **Figure 3.2 – Sheet 2 (Volume IV)**).

Route Description

3.3.13. Starting at the Ince AGI, the section route heads southwards to the east of Elton before crossing the Hapsford railway line (including a spur to an existing depot which serves the Encirc glass factory). The route continues north of the M56 Chester Services (junction 14) before crossing the A5117 Chester Road and heading in a south westerly direction south of Elton.

3.3.14. The route continues west before heading in a north westerly direction towards Thornton-le-Moors. The route crosses the B5132 Cryers Lane, before heading northwards to the Stanlow AGI located within the Stanlow Manufacturing Complex. From the Stanlow AGI, the section heads south, crossing the A5117 Chester Road, using Trenchless Installation Techniques, before continuing a southward trajectory east of Thornton-le-Moors

Trenchless Crossings

3.3.15. In this section, Trenchless Installation Techniques are proposed at the following locations. Further information, including related work numbers, is available in **Appendix 3.1 – Table of Trenchless Crossings (Volume III)**.

- TRS-01: Hapsford railway line (including a spur to an existing depot which serves Encirc glass factory.);
- TRS-02: A5117 Chester Road (north of M56 Chester Services);
- TRS-03 and TRS-04: Existing utilities (two locations);
- TRS-05: A5117 Chester Road (Ince AGI to Stanlow AGI Pipeline); and
- TRS-06: A5117 Chester Road (Stanlow AGI to Flint AGI Pipeline) east of Thornton Le Moors).

Section 2

Summary of Section

3.3.16. Section 2 is located entirely within the Cheshire West and Chester local authority boundary and spans four Parish Council boundaries (Thornton-le-Moors, Mickle Trafford & District, Wervin, and Backford).

3.3.17. Section 2 includes a continuation of the Stanlow AGI to Flint AGI Pipeline and contains the Rock Bank BVS, located between the settlements of Chorlton and Caughall. Section 2 of the Newbuild Carbon Dioxide Pipeline is shown on **Figure 3.2 – Sheet 3 (Volume IV)**. It spans between the Stanlow AGI and the A41.

Route Description

3.3.18. The section continues in a southward trajectory east of Thornton-le-Moors and the Gowy Meadows Nature Reserve. The route crosses the M56 before heading in a south westerly direction crossing the River Gowy and North Cheshire Way (long distance footpath).

3.3.19. The Newbuild Carbon Dioxide Pipeline route crosses Mill Brook and Picton Lane before heading south of Wervin and makes a sharp turn west before crossing the M53. From the M53, the route crosses Wervin Road then runs broadly westwards through arable fields to the north of Chester.

3.3.20. The section continues in a south westerly direction before heading west and crossing the Shropshire Union Canal (the canal path is also National Cycle Network Route 5) approximately 600 m south west of Wervin New Hall. The pipeline continues in a north-westerly direction towards Chorlton Lane.

3.3.21. The section continues in a westerly direction before crossing the A41 Liverpool Road where section 3 commences.

Trenchless Crossings

3.3.22. In this section, Trenchless Installation Techniques are proposed at the following locations. Further information, including related work numbers, is available in **Appendix 3.1 – Table of Trenchless Crossings (Volume III).**

- TRS-07, TRS-10, TRS-12, TRS-13, TRS-16, TRS-19: Existing utilities (six locations);
- TRS-08: M56;
- TRS-09: River Gowy;
- TRS-10: Picton Lane;
- TRS-14: M53;
- TRS-15: Wervin Road; and
- TRS-17: Shropshire Union Canal.

Section 3

Summary of Section

3.3.23. Section 3 is located predominantly within the Cheshire West and Chester local authority boundary, but part of the Section is located within Flintshire. It spans five Parish Council and Community Council boundaries (Backford, Lea-by-Backford, Mollington, Saughall and Shotwick Park, and Sealand).

3.3.24. Section 3 includes the Mollington BVS to the west of the settlement of Mollington. Section 3 of the Newbuild Carbon Dioxide Pipeline is

shown on **Figure 3.2 – Sheet 4 (Volume IV)**). It spans between the A41 and A548 Sealand Road.

Route Description

3.3.25. Heading west from the A41 Liverpool Road, the section continues in a generally south westerly direction crossing Backford Brook and then the Chester and Birkenhead Railway Line before turning in a north-westerly direction to cross Station Road. The section then takes a sharp turn to head in a westerly direction towards Mollington, crossing Grove Road.

3.3.26. The section starts to head in a south westerly direction, to the west of the settlement of Mollington, and crosses Townfield Lane and Overwood Lane. It then continues south before crossing the A540 Parkgate Road. At this point, the section continues in a south westerly direction, exits the Cheshire Plain, crosses Hermitage Road, and then crosses the border into Wales. At the border between Wales and England, the section continues to head in a south westerly direction and crosses the A548 Sealand Road where Section 4 commences.

Trenchless Crossings

3.3.27. In this section, Trenchless Installation Techniques are proposed at the following locations. Further information, including related work numbers, is available in **Appendix 3.1 – Table of Trenchless Crossings (Volume III)**.

- TRS-18: A41 Liverpool Road;
- TRS-19: Existing utilities;
- TRS-20: Mollington Railway Line;
- TRS-21: Station Road
- TRS-22: Townfield Lane;
- TRS-23: Overwood Lane;
- TRS-24: A540 (Parkgate Road);
- TRS-25: Hermitage Road;
- TRS-26: Chester Millennium Greenway; and
- TRS-27: A548 Sealand Road.

Section 4

Summary of Section

3.3.28. Section 4 is located entirely within the Flintshire local authority boundary, and spans three Community Council boundaries (Sealand, Queensferry, and Hawarden). Section 4 of the Newbuild Carbon Dioxide Pipeline is shown on **Figure 3.2 – Sheet 5 (Volume IV)**. It

spans between the A548 Sealand Road and the A550 Gladstone Way.

Route Description

3.3.29. From the A548 Sealand Road, the section continues south westerly to cross the River Dee (Afon Dyfrdwy) and North Wales Coast Railway Line before turning west. The section crosses the B5129 Chester Road East heading north west across Moor Lane towards the built-up sub-urban edge of Sandycroft, Mancot, and Queensferry.

3.3.30. The section weaves through residential areas and crosses several minor roads before turning westwards towards Willow Park. Continuing to head in a westerly direction, the route weaves through the residential areas of Mancot and Pentre before crossing the A550 Gladstone Way where Section 5 commences.

Trenchless Crossings

3.3.31. In this section, Trenchless Installation Techniques are proposed at the following locations. Further information, including related work numbers, is available in **Appendix 3.1 – Table of Trenchless Crossings (Volume III)**.

- TRS-28: River Dee (Afon Dyfrdwy);
- TRS-29: North Wales Coast Railway Line and associated ditches;
- TRS-30: B5129 Chester Road (East);
- TRS-31 and TRS-32: B5129 Chester Road (West) (in two locations);
- TRS-33: Mancot Lane; and
- TRS-34: A550 Gladstone Way.

Section 5

Summary of Section

3.3.32. Section 5 is located entirely within the Flintshire Local Authority boundary, and spans three Community Council boundaries (Hawarden, Northop Hall, and Northop).

3.3.33. Section 5 includes the Aston Hill BVS and Northop Hall AGI. The Aston Hill BVS is located within the Harwarden Community Council between the settlements of Mancot and Ewloe. The Northop Hall AGI is within the Northop Hall Community Council to the north of the A55 between the settlements of Northop Hall and Northop. Section 5 of the Newbuild Carbon Dioxide Pipeline is shown on **Figure 3.2 – Sheet 6 (Volume IV)**). It spans from the A550 Gladstone Way to the B5126 Connah's Quay Road. the B5126 Connah's Quay Road.

Route Description

3.3.34. From the A550 Gladstone Way, the section heads south west before travelling in a general north-west direction, crossing the Lower Aston Hall Lane, then the Wrexham to Bidston (Borderlands) railway line and the A494 Aston Expressway.

3.3.35. The section continues underneath Church Lane before heading north of Aston Hall Farm. The route crosses Shotton Lane before heading in a south westerly direction towards the B5125 Holywell Road.

3.3.36. The section crosses the B5125 Holywell Road before heading in a south westerly direction, crossing Green Lane in two locations before heading north west towards the A55 North Wales Expressway. The section then follows parallel to the path of the A55 North Wales Expressway heading in a north westerly direction towards Northop Hall, and crosses Robin Hood Lane.

3.3.37. The section crosses Alltami Brook, either via a trenched crossing or an embedded pipe bridge, and Brookside south west of The Northop Hall Country House Hotel and continues in a north westerly direction skirting around the south western edge of Northop Hall. The route continues to head north crossing the B5125 Stamford Way before reaching B5126 Connah's Quay Road, the boundary with Section 6~~The section crosses Alltami Brook and Brookside south west of The Northop Hall Country House Hotel and continues in a north westerly direction skirting around the south western edge of Northop Hall. The route continues to head north crossing the B5125 Stamford Way before reaching B5126 Connah's Quay Road, the boundary with Section 6~~.

Trenchless Crossings

3.3.38. In this section, Trenchless Installation Techniques are proposed at the following locations. Further information, including related work numbers, is available in **Appendix 3.1 – Table of Trenchless Crossings (Volume III)**.

- TRS-35: Playground near to Aston Hall;
- TRS-36: Wrexham to Bidston (Borderlands) railway line;
- TRS-37: A494 (Aston Expressway);
- TRS-38: Church Lane;
- TRS-39: Holywell Road;
- TRS-40: Green Lane; and
- TRS-41 Ancient Woodland near to Northop Hall.

Section 6

Summary of Section

3.3.39. Section 6 is located entirely within the Flintshire local authority boundary and spans two Community Council boundaries (Northop and Flint).

3.3.40. The Flint AGI is located within this Section, at the end of the Stanlow AGI to Flint AGI Pipeline and the start of the Flint AGI to Flint Connection Pipeline which is included in this Section. Section 6 of the Newbuild Carbon Dioxide Pipeline is shown on **Figure 3.2 – Sheet 7 (Volume IV)**). It spans from the B5126 Connah's Quay Road to the Flint Connection, where the Newbuild Carbon Dioxide Pipeline connects to the existing Flint Connection to PoA Terminal Pipeline.

Route Description

3.3.41. From B5126 Connah's Quay Road, the section heads northwards, running west of Leadbrook Wood and crossing Northop Brook. The route continues northwards, and crosses Starkey Lane. It then runs parallel with Allt-Goch Lane, before reaching the Flint AGI.

3.3.42. From the Flint AGI, the short section of 24" pipeline runs for approximately 400m in a north easterly direction before meeting the Flint Connection. At this point, the route connects to the existing Flint Connection to PoA Terminal Pipeline.

3.3.43. Trenchless Crossings

3.3.44. In this section Trenchless Installation Techniques are proposed at TRS-42 Connah's Quay Road, and TRS-43: Northop Brook. Further information, including related work numbers, is available in **Appendix 3.1 – Table of Trenchless Crossings (Volume III)**.

3.4. ABOVE GROUND INFRASTRUCTURE

INTRODUCTION

3.4.1. This section summarises the design and characteristics of permanent above ground infrastructure that will be constructed as part of the DCO Proposed Development.

3.4.2. The above ground infrastructure consists of Above Ground Installations (AGIs), Block Valve Stations (BVSs), Cathodic Protection (CP) Cabinets, CP Test Points, and Marker Posts. An Embedded Pipe Bridge is included as an option~~The above ground infrastructure consists of Above Ground Installations (AGIs), Block Valve Stations (BVSs), Cathodic Protection (CP) Cabinets, CP Test Points, and Marker Posts~~.

3.4.3. The proposed surface water drainage arrangements for AGIs and BVSs that are detailed within the **Outline Surface Water Drainage Strategy (OSWDS) (Document reference: D.6.5.13)** have been used

as a basis of assessment for this ES. However, at Detailed Design stage, the Construction Contractor will prepare a detailed Surface Water Drainage Strategy based on the OSWDS (**D-PD-005** of the **REAC, Document Reference: D.6.5.1**).

ABOVE GROUND INSTALLATIONS

3.4.4. The AGIs provide a transition point along the underground Newbuild Carbon Dioxide Pipeline route where it connects to the Upstream Emitters or another section of pipeline. AGIs are specifically designed to operate and maintain the pipeline network for a period of 25 years. The location of the AGIs are shown on **Figure 3.2 – DCO Proposed Development (Volume VI).**

3.4.5. The general characteristics and purpose of the AGIs are as follows:

- Continual remote monitoring of the pipelines for operation and maintenance;
- Telemetry to allow remote operation of control valves; and
- Protection against loss of containment.

3.4.6. Each AGI site will comprise:

- Electrical and Instrumentation (E&I) Kiosk (maximum 5m high) for distributing power and for control and monitoring of the system;
- Associated infrastructure (auxiliary pipework and valves, instrumentation and sensors, cable trays, electrical transformers, and access arrangements);
- Secure chain-link fencing up to 3m high incorporating a double access gate for maintenance vehicles, including an additional barbed-wire section at the top;
- Lighting will be activated if required for maintenance or in the event of an emergency. Lighting will therefore only be on for short, temporary time periods, with the exception of Stanlow AGI (where security lighting is on permanently due to safety reasons owing to its surrounding industrial context - i.e. the Stanlow Manufacturing Complex). This includes perimeter lighting columns up to 5 m in height;
- Crushed aggregate ground finish, with an area paved to site the electrical transformer, E&I Kiosk and parking provision for up to 2 large maintenance vehicles;
- A new permanent access track which would connect the AGI to the local road network. Each track would be of crushed aggregate finish and would be up to 6m wide. New power and fibre optic telecommunication connections to the existing utility network will be contained within / alongside each of the access tracks, except

Stanlow AGI which will have above ground connections (more details are provided in **Section 3.5**); and

- All equipment will be elevated on concrete foundations/plinths to mitigate flood risk, and no sensitive equipment will be located near ground level. This is further discussed in **Chapter 18 – Water Environment and Flood Risk (Volume II)**.

3.4.7. The AGIs will not be permanently manned as they will be operated remotely. They will include the following security features:

- Low lux or infrared/thermal CCTV cameras;
- Intrusion detection systems (sensors); and
- Access control systems (card access).

3.4.8. Further detail on the key components, and scale of each AGI is provided below.

Ince AGI

3.4.9. A general arrangement for the Ince AGI compound is shown on **Ince AGI Indicative Layout (Drawing Reference: EN070007-D.2.12-LAY-Sheet 2).**

3.4.10. The Ince AGI will comprise an area within the fence line of approximately 60 m x 46 m in size. Access to the Ince AGI would be via a new permanent access track which connects into Elton Lane **(Work Number 2)**.

3.4.11. The Ince AGI will be designed to accommodate the following provisions:

- Connection points to the upstream emitters with High-Integrity Pressure Protection Systems (HIPPS), instrumentation and control valves;
- Connection point for potential future pipeline connections as part of future stages of the Project;
- Pipeline Inspection Gauge (PIG) launcher facilities (please refer to **Section 3.7** for further detail) for the Ince AGI to Stanlow AGI Pipeline;
- CO_2 supply manifold with temporary CO_2 vent facilities (please refer to **Section 3.7** for further detail); and
- Analyser house.

3.4.12. The **OSWDS (Document Ref: D.6.5.13)** assumes for Ince AGI that discharge would be to the East Central Drain via an infiltration trench on the gravelled areas, vegetated attenuation pond and filter channel.

Stanlow AGI

3.4.13. An indicative general arrangement for the Stanlow AGI compound is shown on **Stanlow AGI Indicative Layout (Drawing Reference: EN070007-D.2.12-LAY-Sheet 4).**

3.4.14. The Stanlow AGI will comprise an area within the fence line of approximately 85 m x 35 m in size. Access to the Stanlow AGI will be via Pool Lane **(Work Number 10)**, where access roads within the Stanlow Manufacturing Complex will be utilised to access the AGI.

3.4.15. The Stanlow AGI will be designed to accommodate the following provisions:

- Connection point to the upstream emitters with HIPPS instrumentation and control valves;
- Connection points for potential future pipeline connections as part of future stages of the Project;
- PIG receiver facilities for the Ince AGI to Stanlow AGI Pipeline;
- PIG launcher facilities for the Stanlow AGI to Flint AGI Pipeline;
- CO_2 supply manifold with temporary CO_2 vent facilities (please refer to **Section 3.7** for further detail); and
- Analyser House;

3.4.16. The **OSWDS (Document Ref: D.6.5.13)** assumes for Stanlow AGI that the surface water drainage will connect into the wider drainage system for Stanlow Manufacturing Complex.

Northop Hall AGI

3.4.17. An indicative general arrangement for the Northop Hall AGI compound is shown on **Northop Hall AGI Indicative Layout (Drawing Reference: EN070007-D.2.12-LAY-Sheet 1).**

3.4.18. The Northop Hall AGI will comprise an area within the fence line of approximately 45 m x 45 m in size. Access to the Northop Hall AGI will be via a new permanent access track which will connect to the B5125 Village Road **(Work Number 46)**.

3.4.19. The Northop Hall AGI will be designed to accommodate the following provisions:

- Below ground block valve on the pipeline; and
- Connection point for potential future pipeline as part of future stages of the Project.

3.4.20. The **OSWDS (Document Ref: D.6.5.13)** assumes for Northop Hall AGI that discharge would be to Wepre Brook via an infiltration trench on the gravelled areas, vegetated attenuation pond and filter channel.

Flint AGI

3.4.21. An indicative general arrangement for the Flint AGI compound is shown on **Flint AGI Indicative Layout (Drawing Reference: EN070007-D.2.12-LAY-Sheet 0).**

3.4.22. The Flint AGI will comprise an area within the fence line of approximately 80 m x 80 m in size. Access to the Flint AGI will be via a new permanent access track off Allt Goch Lane **(Work Number 49)**, a minor road which connects into Starkey Lane and the A5119 Northop Road.

3.4.23. The Flint AGI will be designed to accommodate the following provisions:

- Connection points for potential future pipelines as part of future stages of the Project;
- PIG receiver facilities for the Stanlow AGI to Flint AGI Pipeline;
- PIG launcher facilities for the Flint AGI to Flint Connection Pipeline and Flint Connection to PoA Terminal Pipeline; and
- CO_2 supply manifold with temporary CO_2 vent facilities (please refer to **Section 3.7** for further detail).

3.4.24. The **OSWDS (Document Ref: D.6.5.13)** assumes for Flint AGI that discharge would be to Little Lead Brook via an infiltration trench on the gravelled areas, vegetated attenuation pond and filter channel.

BLOCK VALVE STATIONS

3.4.25. The BVSs are facilities to host a block valve. Block valves are used to isolate sections of pipeline for maintenance purposes or in case of emergency. Early detection systems installed along the pipeline will identify if a potential fault has occurred and at what location, following which the appropriate block valves would then be remotely closed to isolate that section of pipeline. Each BVS would also have a local bypass to facilitate start-up and maintenance activities.

3.4.26. The BVSs are specifically designed to maintain the pipeline network for a period of 25 years.

3.4.27. The general characteristics and purpose of the BVSs are as follows:

- System isolation for maintenance or in case of an emergency;
- Continual remote monitoring of the pipelines for operation and maintenance;
- Telemetry to allow remote operation of control valves; and
- Protection against loss of containment.

3.4.28. The BVSs are of a uniform size of approximately 45 m x 40 m and typically follow a similar internal arrangement. References to the specific general arrangement plans for each BVS is provided in **Table 3.1**. The location of the BVSs are shown on **Figure 3.2 – DCO Proposed Development (Volume VI).** The block valves will be installed below ground level to an anticipated minimum depth of approximately 1m, with only limited above ground visible elements.

3.4.29. Each BVS will comprise:

- E&I Kiosk (maximum 5m high) for distributing power and for control and monitoring of the system;
- Associated infrastructure (auxiliary pipework and valves, instrumentation and sensors, cable trays, electrical transformer, and access arrangements);
- Secure chain-link fencing up to 3 m high incorporating a double access gate for vehicles;
- Lighting will be activated if required for maintenance or in the event of an emergency. Lighting will therefore only be on for short, temporary time periods. This includes perimeter lighting columns up to 5 m in height.
- Crushed aggregate ground finish, with an area paved to site the E&I Kiosk and parking provision for up to two large maintenance vehicles;
- A new permanent access track which would connect the BVS to the local road network. Each track would be of crushed aggregate finish and would be up to 3 m wide. New power and fibre optic telecommunication connections to the existing utility network will be contained within / alongside each of the access tracks (more details are provided in **Section 3.5**); and
- All equipment will be elevated on concrete foundations/plinths to mitigate flood risk, and no sensitive equipment will be located near ground level. This is further discussed in **Chapter 18 – Water Environment and Flood Risk (Volume II)**.

3.4.30. As per the AGIs, the BVSs would not be manned but would be monitored and controlled remotely. They would also include the same security features as follows:

- Low lux or infrared/thermal CCTV cameras;
- Intrusion detection systems (sensors); and
- Access control systems (card access).

3.4.31. A total of six BVSs would be installed as part of the DCO Proposed Development. Three BVSs will be located along the Stanlow AGI to

Flint AGI Pipeline and three will be located along the existing Flint Connection to PoA Terminal Pipeline. There are no BVSs located along the Ince AGI to Stanlow AGI Pipeline or Flint AGI to Flint Connection Pipeline.

3.4.32. Cornist Lane BVS, Pentre Halkyn BVS and Babell BVS will have new sections of tie-in pipelines installed to connect the new BVSs to the existing Flint Connection to PoA Terminal Pipeline.

3.4.33. **Table 3.1** provides further detail on the arrangements for each BVS.

Table 3.1 - Description of the Proposed Block Valve Stations

BVS Name	Location	General Arrangement	Access	OSWDS Assumption
Stanlow AGI to Flint AGI Pipeline				
Rock Bank	Rock Bank BVS will be located within Backford Parish Council, between the settlements of Chorlton and Caughall. The location of the BVS is shown on **Figure 3.2 – Sheet 2 (Volume VI).**	An indicative general arrangement is provided in **Rock Bank BVS Indicative Layout (Drawing Ref: EN7007-D.2.9-LAY-Sheet 3).**	A new permanent access track would be created from Chorlton Lane **(Work Number 21)**.	Surface water will discharge to Canal Ditch via an infiltration trench, attenuation pond and filter channel.
Mollington	Mollington BVS will be located within Mollington Parish Council, approximately 300m west of the village of Mollington. The location of the BVS is shown on **Figure 3.2 – Sheet 3 (Volume VI)**.	An indicative general arrangement is provided in **Mollington BVS Indicative Layout (Drawing Ref: EN7007-D.2.9-LAY-Sheet 2).**	A new permanent access to the BVS will be created from Overwood Lane, which connects to the A540 Parkgate Road to the south **(Work Number 27)**.	Surface water will discharge to Overwood Ditch via an infiltration trench, attenuation pond and filter channel.
Aston Hill	Aston Hill BVS will be located within Hawarden Parish Council in an urban area between the settlements of Mancot, Pentre, Hawarden, Ewloe and Shotton. The location of the BVS is shown on **Figure 3.2 – Sheet 5 (Volume VI).**	An indicative general arrangement is provided in **Aston Hill BVS Indicative Layout (Drawing Ref: EN7007-D.2.9-LAY-Sheet 1).**	A new permanent access track will be created to the BVS from Lower Aston Hall Lane **(Work Number 37)**.	Surface water will discharge to Aston Hill Brook Trib via an infiltration trench, attenuation pond and filter channel.
Flint Connection to PoA Terminal Pipeline				

BVS Name	Location	General Arrangement	Access	OSWDS Assumption
Cornist Lane	Cornist Lane BVS will be located in Flint Community Council, in a rural area between the settlements of Flint and Pentre Halkyn. The location of the BVS is shown on **Figure 3.2 – Sheet 7 (Volume VI).**	An indicative general arrangement is provided in **Cornist Lane BVS Indicative Layout (Drawing Ref: EN7007-D.2.9-LAY-Sheet 6).**	A new permanent access track will be created from Cornist Lane **(Work Number 52)**.	Surface water will discharge to Afon Nant-y-Fflint via an infiltration trench, attenuation pond and filter channel.
Pentre Halkyn	Pentre Halkyn BVS will be located in Brynford Community Council, approximately 700m south of the village of Brynford. The location of the BVS is shown on **Figure 3.2 – Sheet 7 (Volume VI).**	An indicative general arrangement is provided in **Pentre Halkyn BVS Indicative Layout (Drawing Ref: EN7007-D.2.9-LAY-Sheet 4).**	A new permanent access track will be created from the B5121 Ally Y Chwiler **(Work Number 54)**.	Surface water will discharge to a field infiltration system via an infiltration trench, attenuation pond and filter channel.
Babell	Babell BVS will be located in Ysceifog Community Council, on the outskirts of the settlement of Babell. The location of the BVS is shown on **Figure 3.2 – Sheet 7 (Volume VI).**	An indicative general arrangement is provided in **Babell BVS Indicative Layout (Drawing Ref: EN7007-D.2.9-LAY-Sheet 5).**	A new permanent access track will be created from Racecourse Lane **(Work Number 56)**.	Surface water will discharge to a field infiltration system via an infiltration trench, attenuation pond and filter channel.

OTHER ABOVE GROUND INFRASTRUCTURE

Cathodic Protection Transformer Rectifier Cabinets and Test Posts

3.4.34. A Cathodic Protection (CP) system will be installed along the Newbuild Carbon Dioxide Pipeline to help protect against corrosion.

3.4.35. Most elements of the CP system, including cabling and ground beds, are buried below ground and will be installed during the construction of the Newbuild Carbon Dioxide Pipeline build. However, above ground CP transformer rectifier cabinets (CP cabinets) will need to be installed along the length of the Newbuild Carbon Dioxide Pipeline.

3.4.36. The CP cabinets, which will be supplied pre-made to site, are expected to be approximately 1m high x 0.5m long x 0.5m wide. It is anticipated that they would be installed on a concrete plinth. An example of a typical CP cabinet is provided in **Insert 3.1**.

Insert 3.1 - A Typical CP Cabinet

3.4.37. There are expected to be three CP cabinets installed along the Newbuild Carbon Dioxide Pipeline at Stanlow AGI, Flint AGI and north of the River Dee. Where the CP Cabinet is installed outside of an AGI or BVS, the preferred location has taken into account:

- The distance from the pipelines;
- Ground resistivity;
- Ease of access for maintenance;
- Proximity to other buried metallic services and infrastructure;
- Proximity to power supplies;
- Avoiding visibility from PRoWs;

- Environmental sensitivities; and
- Minimising interference with agricultural operations.

3.4.38. The CP cabinet north of the River Dee would be positioned along Deeside Lane and secured by a 1 m high timber fence surrounded by hedgerow to prevent unauthorised access and avoiding visibility from the nearby PRoW. Permanent access rights to this CP cabinet would be from Deeside Lane, and no new permanent track would be required. The remaining two cabinets are secured by virtue of their location within the AGI facilities. The CP cabinets would not require any additional lighting.

3.4.39. The CP system will also include small above ground CP test posts. These will be installed along the Newbuild Carbon Dioxide Pipeline to allow maintenance inspectors to take readings of the CP system. The CP test posts will be installed along the Newbuild Carbon Dioxide Pipeline route, usually placed within AGIs and BVSs and near road, river and rail crossings, directly above the pipeline and positioned within verges to reduce disturbance to land uses. The specific location of these small test posts will be confirmed at Detailed Design when the precise alignment of the Newbuild Carbon Dioxide Pipeline is confirmed.

Marker Posts

3.4.40. The DCO Proposed Development will include the installation of pipeline marker posts at all road, rail, river, canal crossings, changes in Newbuild Carbon Dioxide Pipeline direction, and field boundaries. These ground-level marker posts are similar in size and appearance to CP test posts (shown in **Insert 3.2**). The exact number, location and design of the marker posts will be confirmed at Detailed Design stage. However, industry standards will be followed and typically the marker posts will be pre-cast reinforced concrete posts with information plaques on them. Markers would be located in a position that reduces disturbance to land uses i.e. at field boundaries or in verges.

3.4.41. The Newbuild Carbon Dioxide Pipeline route will also be marked with red and black colour-coded aerial marker posts at a typical frequency of about 1km and/or at major changes of direction of the pipeline. These will be used when the Newbuild Carbon Dioxide Pipeline is inspected by helicopter and will be positioned at field boundaries where possible.

Insert 3.2 - A Typical Marker Post and CP Test Post

3.5. OTHER INFRASTRUCTURE

Fibre Optic Cable (FOC)

3.5.1. Fibre Optic Cable (FOC) connections will be required to establish a telecommunication link between the PoA Terminal's safety and control systems and the new AGIs and BVSs.

3.5.2. A FOC will be installed along the length of the Ince AGI to Stanlow AGI Pipeline and Stanlow AGI to Flint AGI Pipeline at a depth no higher than the top of the pipeline. The FOC will be installed either within the pipeline trench or where this is not possible, for example at trenchless crossings, adjacent to the pipeline. This FOC will allow communication between the AGIs and BVSs along the Newbuild Carbon Dioxide Pipeline. Each AGI and BVS will also be separately connected to the telecommunications network.

3.5.3. For Cornist Lane BVS, Pentre Halkyn BVS, Babell BVS and Flint AGI, two separate connections to the local telecommunications network will be installed as there will not be a FOC installed along the Flint AGI to Flint Connection Pipeline and Flint Connection to PoA Terminal Pipeline.

3.5.4. For the AGIs and BVSs, the separate FOC connections to the telecommunications network will be laid parallel to the new permanent access tracks of each facility to where the new track meets the adopted road network. From this point, connection to the wider telecommunications infrastructure network will be made by the relevant statutory undertaker and is therefore not included in the DCO Application. Discussions are ongoing with the statutory undertakers and the Detailed Design of the connection to the existing network will

be undertaken once the DCO is made. For the EIA, it is assumed that connection would be via the closest adopted highway. The potential for cumulative impacts from the installation of new FOC has been considered as part of the EIA, and further detail is provided in **Chapter 19 – Combined and Cumulative Assessment (Volume II)**.

Electricity Connections

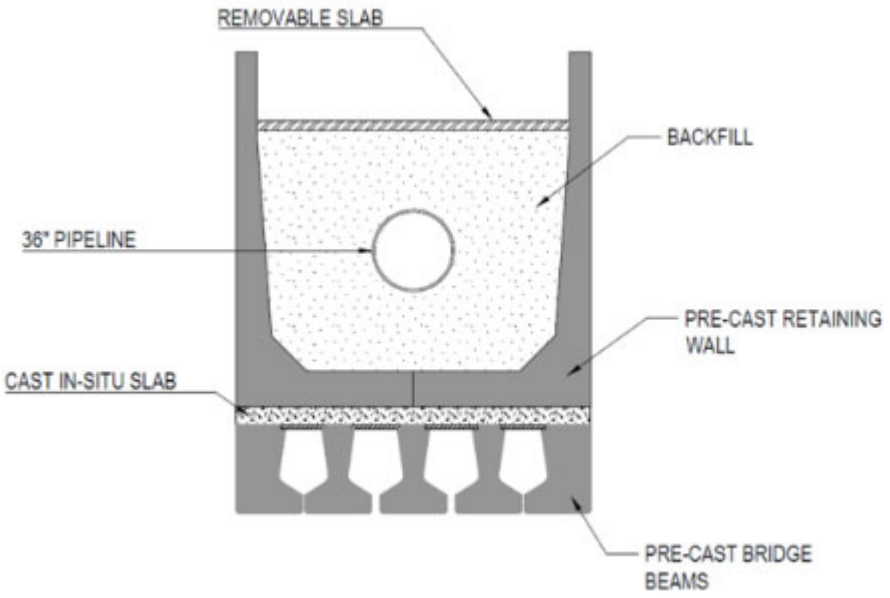
3.5.5. Each AGI, BVS and standalone CP cabinet will require a connection to the local electricity network at the nearest practicable connection points. For the EIA, it is assumed that would be via the closest adopted highway. Any connection works up to that point will be undertaken via the respective statutory undertakers so are not included as part of the DCO Proposed Development. However, the potential for cumulative impacts from these connections has been considered as part of the EIA (refer to **Chapter 19 – Combined and Cumulative Assessment, Volume II**).

Embedded Pipe Bridge

3.5.6. 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.

3.5.7. The bridge and its foundations will be primarily constructed from concrete. The pipeline will be installed and completely buried within the structure. Dependent on the final design of the bridge and the height off the ground, the sides of the bridge would have steel handrails or fencing for fall protection and security. Either end of the bridge would be gated and fenced off from the public to prevent trespassing.

3.5.8. For the purpose of this ES ~~Addendum 2~~ the span of the Alltami Brook embedded pipe bridge option is approximately 15 m and will be approximately 4 m wide and 5 m in height. A conservative 1.5 m has been assumed for the vertical clearance above the Brook within the preliminary design; The final dimensions, including span and clearance will be determined at detailed design, based on detailed topographic surveys, ground investigations, flood modelling and ecology surveys and minimising the loss of vegetation. A sketch illustrating an indicative cross-section of the bridge is presented in **Insert 2.1**. Further drawings are provided within **Alltami Brook Crossing - Options Appraisal (document reference D.7.27).**



Insert 2.1: A sketch illustrating an indicative cross section of the embedded pipe bridge design option.

3.5.9. Any rainfall infiltrating the U-shaped section of the bridge will be drained via pipes embedded into the walls and base of the concrete trough, similar to a French drain, where unpolluted surface water would discharge from the ends of the bridge.

3.5.10. No permanent lighting or power provision will be required.

~~3.5.5.~~3.5.11. It is expected that piled foundations will not be required due to the shallow bedrock within the gorge; however, piled foundations for the abutments, as an alternative to standard shallow and direct foundations, could be required depending on the actual soil conditions and the associated mechanical properties. This will need to be further investigated during detailed design.

3.6. CONSTRUCTION OF THE DCO PROPOSED DEVELOPMENT

OVERVIEW

3.6.1. This section describes key construction activities for the DCO Proposed Development. In addition, it provides detail on the temporary works that will need to be provided for the installation of the Newbuild Carbon Dioxide Pipeline, AGIs, BVSs and associated permanent infrastructure. This section considers pre-construction, construction techniques, reinstatement and programming.

OUTLINE CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (OCEMP) AND REGISTER OF ENVIRONMENTAL ACTIONS AND COMMITMENTS (REAC)

3.6.2. An **OCEMP (Document reference: D.6.5.4) and REAC (Document reference: D.6.5.1)** have been prepared with the DCO Application. The REAC contains the mitigation relied upon in the EIA to manage the environmental impacts of the DCO Proposed Development. The REAC provides a clear list of commitments, actions and mitigation measures.

3.6.3. The OCEMP outlines key documents and associated management plans required during construction. Detailed CEMPs will be prepared by the Construction Contractor(s) post-consent which will include mitigation presented in the REAC and relied upon in the ES, as included as a Requirement of the **Draft DCO** (**Document Reference: D.3.1**). The Detailed CEMP will be produced substantially in accordance with the OCEMP.

PRE-CONSTRUCTION ACTIVITIES

3.6.4. Ahead of construction, a number of pre-construction activities will need to be carried out and are likely to include the following:

- Condition/defect surveys of existing infrastructure and assets where required;
- Topographical surveys;
- Geotechnical and ground stability surveys (including sampling of groundwater);
- Archaeological investigations;
- Ecological pre-construction surveys and mitigation work;
- Route setting out in consultation with the landowner/occupier; and
- Site clearance and preparation.

3.6.5. Surveys and engagement with utility providers has been undertaken to identify known utilities within the Newbuild Infrastructure Boundary. None of the known utilities have any requirement for diversion as the depth of the Newbuild Carbon Dioxide Pipeline should enable the existing utilities to be crossed without disturbance using trenchless crossing techniques.

3.6.6. Ground investigations have been carried out in order to inform the preliminary design; however, further investigations will be required to inform the Detailed Design. Further information is provided in **Chapter 11 - Land and Soils (Volume II).**

3.6.7. A temporary drainage system would be implemented prior to the start of any construction work where necessary.

TEMPORARY CONSTRUCTION COMPOUNDS

3.6.8. Temporary Construction Compounds **(Work Numbers 1A, 6A, 6B, 9A, 15A, 19A, 20A, 26A, 30A, 30D, 31A, 36A, 41A, 43A, 44A, 44C, 48A, 51A, 53A, and 55A)** will be established before commencement of the main construction works. As described in **Chapter 5 – EIA Methodology (Volume II)**, the ES has assessed the reasonable worst case location of each Construction Compound within the areas marked on **Figure 3-2 DCO Proposed Development (Volume IV).**

3.6.9. There will be three types of Construction Compounds serving different types of construction works, namely Centralised Compounds **(Work Numbers 6B, 15A, 19A, 30A, 30D, 31A, 41A and 44C)**, Trenchless Crossing Compounds (included as works within the relevant pipeline works descriptions in the DCO) and Localised Compounds **(Work Numbers 1A, 6A, 9A, 20A, 26A, 36A, 43A, 44A, 48A, 51A, 53A, and 55A)**. All three types of temporary Construction Compound will have the following general characteristics:

- Enclosed using temporary security fencing (HERAS style or equivalent);
- All necessary signage advising of access restrictions and/or Public Right of Way (PRoW) diversions relevant for each compound will be clearly displayed;
- Comprise a material laydown area, yard (located away from drainage systems and excavations), office trailer(s), mess room, toilets, first aid room, container storage and waste storage e.g. skips;
- Will not be connected to existing utilities, therefore using self-contained mobile welfare facilities (serviced by a vacuum truck), generators for power, and mobile communications;
- Parking provision for workers;
- All excavated material will be temporarily stored within the compound fence line;
- Construction lighting will follow BS EN 12464 (Parts 1 and 2) (**Ref: 3.2**) and guidance notes from the Institution of Lighting Professionals, GN01 (**Ref: 3.3**) and GN08 (**Ref: 3.4**). In general, lighting will be used in shifts at the lowest luminosity necessary for safe delivery of each task i.e. it will not be continuous. It will be designed, positioned, and directed to reduce the intrusion into adjacent properties and habitats. The exception to this would be at trenchless crossings where 24-hour working may be required. This would be a maximum 4-week period at each location;

- Access will be established from the existing road network via temporary access tracks (locations of temporary accesses can be found in **Chapter 17 Traffic and Transport (Volume II).** Establishment will consist of:
  - Strip topsoil;
  - Install one of the following options (depending upon local ground conditions and other variables):
    - Bare soil track;
    - Wooden bog-matts;
    - Compacted gravel track;
    - Propriety aluminium trackway; and
    - Asphalt or concrete sealed surfaces.
- Temporary drainage solutions will be installed where required, including along temporary access tracks.

3.6.10. Further detail on the three types of Construction Compound are as follows.

Centralised Compounds

3.6.11. Seven Centralised Compounds will be established in locations close to the strategic road network before commencement of the main construction works. The area in which they will be sited is outlined in orange on **Figure 3-2 DCO Proposed Development (Volume IV)**. Although 8 centralised compounds are being assessed in the EIA, only 7 are expected to be implemented to facilitate construction of the DCO Proposed Development. The Centralised Compounds will serve as points for accepting deliveries and storage of equipment, pipe and other material. From the Centralised Compounds, pipe sections and equipment will be transported directly to the storage areas within the various other compounds and workfronts by appropriate transport.

3.6.12. The Centralised Compounds will occupy an area no larger than 90,000 m^2. Set up is expected to take 3-4 weeks. Centralised Compounds will be in place for the duration of the construction programme.

3.6.13. Further to the general characteristics that all Construction Compounds will comprise, each of the Centralised Compounds will also include the following features:

- Security cabin;
- Temporary facility for storage of specific materials. Any electrical equipment or dangerous materials will be stored in an isolated partition of the main warehouse building equipped with air conditioning and bunds or drip trays;

- Temporary workshops for the prefabrication of piping, piping sandblasting and painting and piping insulation; and
- Concrete coverage may be used for entrance/access tracks, warehouses, and bunded refuelling areas, amongst other uses. This will be broken up and disposed of at the end of construction activities as part of the reinstatement activities.

Trenchless Crossing Compounds

3.6.14. Each trenchless crossing will require two dedicated Construction Compounds to facilitate the works at either side of the feature that is being crossed. A larger compound will be required on the “entrance” site and a smaller compound will be on the “exit” side.

3.6.15. The DCO Proposed Development has 43 trenchless crossings; however not all will have a Trenchless Crossing Compound as some crossings are served by Localised Compounds.

3.6.16. The Trenchless Crossing Compounds will be up to 50 m x 50 m in size (not including space for pipe stringing or earthworks which will be outside of the compound area but associated with the trenchless crossing construction works and within the Newbuild Infrastructure Boundary); these compounds will be in place for the duration of the works associated with the trenchless crossing according to the construction programme, which is expected to be no longer than 3 months per crossing. Following cessation of works out of the Trenchless Crossing Compound, it will be dismantled and the land will be reinstated back to it’s former use.

3.6.17. The following features are common across all Trenchless Crossing Compounds:

- Provision for equipment yard, supervisor’s office and laydown area;
- Provision for a crane movement area and staging laydown;
- Specialised trenchless crossing equipment; and
- HDD crossings will include provision for drilling rig and associated ancillaries (control cabinet, power packs, water and bentonite tanks, pumps).

Localised Compounds

3.6.18. Localised Compounds will be required to serve the construction works at AGI and BVS locations. There are also a number of open-cut trench crossings that will require a Localised Compound to facilitate the more complex construction works. This will include the crossings at Alltami Brook and the Northop Hall road.

3.6.19. Localised Compounds will be up to approximately 35 m x 35 m in size and at the BVSs/AGIs are expected to be in place for the duration of the construction programme. At open cut trench locations they are expected to be in place for the duration for the works associated with that crossing according to the construction programme, which is expected to be no longer than 3 months.

3.6.20. Further to the general characteristics that all Construction Compounds will comprise, each of the Localised Compounds will have the following additional characteristics:

- Provision for equipment yard, supervisor's office and laydown area; and
- Provision included for a crane movement area and staging laydown.

3.6.21. To reduce the temporary footprint of compounds, welfare facilities may be shared between work sites where there is more than one compound in proximity to another.

PIPELINE CONSTRUCTION TECHNIQUES AND SEQUENCING

Overview and Sequencing

3.6.22. The majority of the Newbuild Carbon Dioxide Pipeline will be constructed in the same way as a natural gas transmission pipeline which typically involves excavation of an open trench, lowering of the pipe into the trench, and backfilling with the excavated material. The ground will be reinstated after construction, allowing previous use to resume where that would not impact on the operation and maintenance of the Newbuild Carbon Dioxide Pipeline and subject to the restrictions imposed to protect the pipeline.

3.6.23. For special crossings such as railway lines, specified roads, rivers and other major infrastructure, the depth will be greater and specialist trenchless installation techniques, such as auger bore and Horizontal Directional Drilling (HDD), will be used. Further detail on specialist trenchless installation techniques is provided in **paragraphs 3.6.55-3.6.58.**

Pipeline Construction Sequencing in Rural Areas

3.6.24. The sequence of activities for pipeline construction in rural areas will typically comprise~~The sequence of activities for pipeline construction in rural areas will typically comprise~~:

- Survey and PRoW preparation;
- Clearing (including the clearing of any existing equipment/infrastructure) and fencing the pipeline working

widthClearing and fencing the pipeline working width; (see **paragraphs 3.6.25 – 3.6.31** for more details);

- Removal of topsoil, which is stored separately to subsoil, on one side of the trench. Topsoil will be stored where it will not be compacted by vehicles or contaminated and will be stored in a manner that will minimise its loss and/or degradation and protected/demarked, if necessary;
- Receiving materials;
- Laying out ('stringing') of pipe sections adjacent to the trench line;
- Welding, inspecting and applying coating to the pipe sections where applicable;
- Excavation of a narrow trench for the pipeline;
- Lifting and lowering of the pipe into the trench;
- Laying of FOC into the trench;
- Backfilling of the trench;
- Removal of topsoil, which is stored separately to subsoil, on one side of the trench. Topsoil will be stored where it will not be compacted by vehicles or contaminated and will be stored in a manner that will minimise its loss and/or degradation and protected/demarked, if necessary;
- Receiving materials;
- Laying out ('stringing') of pipe sections adjacent to the trench line;
- Welding, inspecting and applying coating to the pipe sections where applicable;
- Excavation of a narrow trench for the pipeline;
- Lifting and lowering of the pipe into the trench;
- Laying of FOC into the trench;
- Backfilling of the trench;
- Pre-commissioning activities (please refer to Pre-commissioning activities (please refer to **paragraphs 3.6.97 - 3.6.99** for further detail);
- Reinstatement of existing drainage features;
- Replacement of topsoil which is levelled and reinstated to the original state (further detail is provided in Reinstatement of existing drainage features;
- Replacement of topsoil which is levelled and reinstated to the original state (further detail is provided in **paragraphs 3.6.37 - 3.6.38**);
- Removal of temporary fencing; and

- Planting and other mitigation.~~Removal of temporary fencing; and~~
- ~~Planting and other mitigation.~~

Pipeline Construction in Urban Areas

3.6.25. The construction of the Newbuild Carbon Dioxide Pipeline in urban areas would follow a similar sequence to that for rural areas but would likely be more constrained. The key differences to the approach may include:

- Increased need for implementation of road closures, diversions, and traffic management measures;
- More constrained working widths associated with increased obstructions and other constraints (for example, services and utilities);
- A greater need for the breaking out of road and other hard surfaces when excavating the pipeline trench; and
- Increased need for reinstatement of road surfaces, footpaths, and landscaped areas.

Open Cut Trenching

Establishing the Working Width

~~3.6.26.~~ Construction works will generally be contained within a fenced construction corridor, termed the Working Width. This would be kept as narrow as ~~possible, but~~possible but would be a maximum width of 32m where reasonably practicable (**D-PD-018** of the **REAC (Document ref: D.6.5.1)**. A typical pipeline construction working width layout is illustrated in **Insert 3.3**.

~~3.6.27.~~

~~3.6.28.~~

~~3.6.29.~~

~~3.6.30.~~

~~3.6.31.~~

~~3.6.32.~~

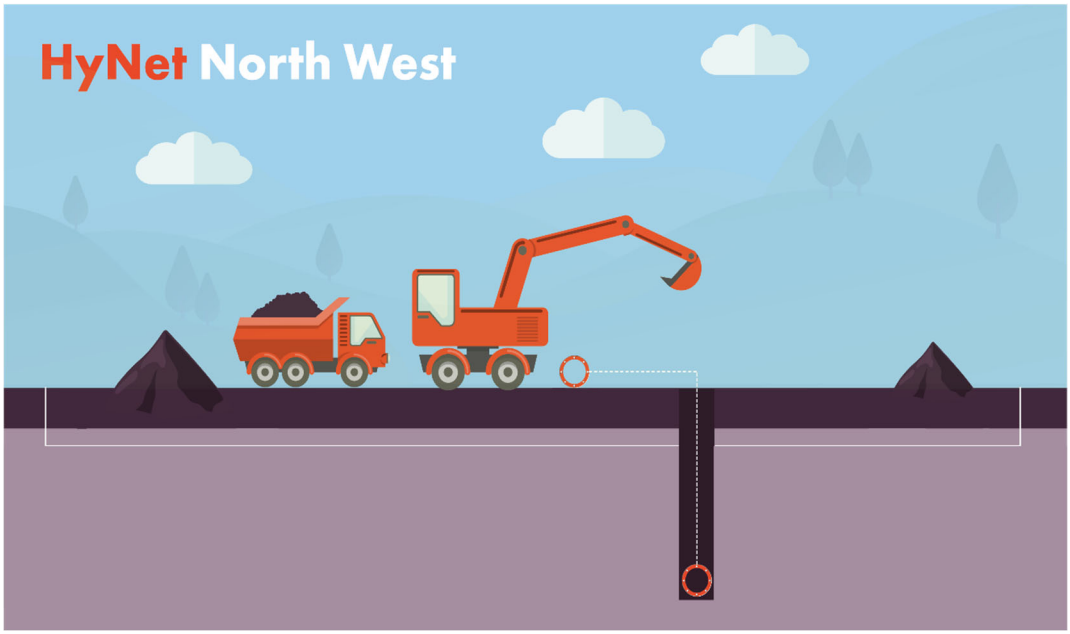
~~3.6.33.~~

~~3.6.34.~~

~~3.6.35. Insert 3.3.~~

~~3.6.36.~~3.6.26.

Insert 3.3 - Typical Cross Section of Construction Working Width



~~3.6.37.~~3.6.27. A narrower working width may be required at specific locations to mitigate ecological impacts or to avoid sensitive structures, such as high voltage electricity transmission towers.

~~3.6.38.~~3.6.28. Vegetation loss will be kept to a minimum along the working width, but some areas may require removal of vegetation to allow the installation of the Newbuild Carbon Dioxide Pipeline. Where hedgerow removal is required to facilitate construction, it has been assumed this will be kept to a maximum width of 15 m (this includes both hedgerows and the trees that sit within hedgerows). Opportunities to reduce the amount of hedgerow removal required at each hedgerow crossing will be explored, with the smallest practicable width of hedgerow removal possible prioritised to facilitate construction of the DCO Proposed Development (**D-BD-012** of the **REAC (Document ref: D.6.5.1)**).

~~3.6.39.~~3.6.29. The working width will be clearly demarcated using temporary fencing. The style of fencing will be selected using local considerations, typically ‘post-and-rope’ fencing for arable land or appropriate stockproof fencing for grazed land. Urban sections or areas with increased levels of public interaction may use HERAS or similar. All temporary fencing will be removed upon completion of the works.

~~3.6.40.~~3.6.30. Where appropriate, pre-construction field drainage will be installed within the working width.

~~3.6.41.~~3.6.31. Temporary water supplies for livestock will be provided with alternative means of supply if field connections are temporarily removed.

~~3.6.42.~~3.6.32. Topsoil or organic surface material will be stripped to one edge of the working width to prevent mixing with subsoils. The stripping of the topsoil will be carried out with great care to provide maximum protection for the soil structure (preventing topsoil and subsoil becoming mixed and avoiding soil contamination). Topsoil will be formed into bunds for temporary stockpiling. Movement on or any kind of compaction of the topsoil will be avoided. As far as practical, topsoil will be stored adjacent to the works and reused locally during post-construction reinstatement.

Pipeline Stringing and Welding

~~3.6.43.~~3.6.33. The Newbuild Carbon Dioxide Pipeline will be constructed by joining together pipe sections of approximately 12 m length. The pipe sections will be transported from the Centralised Compounds to the workfronts by appropriate transport and laid out adjacent to the pipeline corridor. This activity is termed ‘stringing’.

~~3.6.44.~~3.6.34. Following stringing, the pipeline sections will be welded together above ground into pipe strings. All the welds will be tested and certified in situ before an approved coating is applied on-site to protect the welds from corrosion. All welds will be subject to Non-Destructive Testing (NDT).

~~3.6.45.~~3.6.35. At this stage, the pipeline trench will not have been excavated and the bulk of the mechanical work to the pipeline will be completed prior to the trench excavation.

Open Cut Trench Excavation

~~3.6.46.~~3.6.36. The pipe trench will be dug either with mechanical excavators or using specialised trenching machines as detailed in **Appendix 3-2 Indicative Plant and Equipment (Volume III)**. The depth of the trench will be variable, but will typically be in the range of 2.5 m – 6 m.

~~3.6.47.~~3.6.37. In areas of very soft or wet ground, the trench will be supported with sheet piling, trench-boxes or suitable trench support to protect the trench from collapse. Trench supports will be removed prior to backfilling of the pipeline trench.

Bedding, Pipe lower and Laying and Backfill

~~3.6.48.~~3.6.38. The trench will be lined with bedding material of either imported clean sand or, where suitable, graded subsoils excavated from the trench. The immediate pipeline surround will be free of stones, rocks, foreign material and vegetation to prevent damage to the coating.

~~3.6.49.~~3.6.39. Welded pipe-strings will be lowered into the trench using side boom pipelayers or equivalent plant. Final welding and coating (known as ‘Tie-Ins’) between sections will be undertaken at regular intervals within the trench.

~~3.6.50.~~3.6.40. Where the ground is particularly waterlogged and containing soils of low density (i.e. through areas of peaty soil), the pipeline will require ballasting with concrete collars or similar to mitigate the impact of buoyancy of the pipeline.

Backfilling

~~3.6.51.~~3.6.41. Once the pipe section has been lowered into place, a backfill of pipeline surround will be placed to a level above the pipeline using either imported clean sand or, where suitable, graded subsoils excavated from the trench. This intimate pipeline surround will be free of stones, rocks, foreign material and vegetation to prevent to prevent damage to the coating.

~~3.6.52.~~3.6.42. The backfilled materials will be consolidated by tamping or rolling. Pre-construction surveys will be undertaken to identify if and where water stops (for example, clay plugs) will need to be installed in the trench to prevent the pipeline surround acting as a conduit for groundwater.

~~3.6.53.~~3.6.43. Chemically/physically suitable surplus material from trench excavations will be beneficially reused on site through backfilling. Any material that does need to be removed from site will likely be beneficially reused through measures put in place by the Materials Management Plan (MMP) that will be produced by the Construction Contractor(s) (**D-LS-006** of the **REAC (Document reference: D.6.5.1)**. The Production of an MMP is included as a Requirement of the **Draft DCO (Document Reference: D.3.1)**. In the event that excavated materials are unsuitable for reuse such as contaminated soils or hazardous materials (not soils i.e. anthropogenic material), the Construction Contractor will follow appropriate legislative requirements and best practice. In the event that there is a requirement for these unsuitable materials to be disposed of off-site, the material would be appropriately classified prior to transport to a suitably licenced landfill /treatment centre. However, it is assumed that if present the quantities of such material would be de-minimis.

~~3.6.54.~~3.6.44. The landowner / occupier will be engaged where any off-site disposal is required. In such instances, disposal will be undertaken in accordance with waste management regulations (England and Wales). Further detail is provided in **Chapter 14 – Materials and Waste (Volume II)**.

Dewatering

~~3.6.55.~~3.6.45. In areas of high groundwater, or after periods of heavy rainfall, the temporary dewatering of the pipe trench and other areas of excavation

may be required to stabilise the surrounding soils and to enable a safe working environment.

~~3.6.56.~~3.6.46. For smaller scale de-watering (such as after periods of heavy rainfall), most local de-watering will be by portable sump-pump discharging to ground through suitable de-silting arrangements. Where required local soil saturation levels will be monitored to prevent water-logging adjacent areas.

~~3.6.57.~~3.6.47. Where larger volumes of de-watering are required, portable pumps will be used to abstract the water into mobile de-silting and water treatment systems.

~~3.6.58.~~3.6.48. The water treatment systems typically incorporate weirs to allow suspended solids and sediment to settle out for removal. Regular quality testing of the water will take place after it has passed through the weirs to determine if further treatment is required prior to discharge, which will be to a nearby watercourse, licenced sewer discharge point, or, if none is present, to greenfield surface. Any captured sediment will be re-used on site where suitable or taken to an offsite recycling facility.

~~3.6.59.~~3.6.49. These activities will be subject to separate consents which will be sought from the relevant authorities (Natural Resources Wales (NRW) (Wales) or Environment Agency (EA) (England)) in advance of the construction works.

Open Cut Trench Excavation Through Watercourses

~~3.6.60.~~3.6.50. Open cut trench will be used to cross watercourses, unless otherwise indicated as using a trenchless technique in **Appendix 3.1 – Table of Trenchless Crossings (Volume III)**.

~~3.6.61.~~3.6.51. Any minor watercourses that are interrupted during the installation of the pipeline will be either temporarily diverted or serviced with pumps to bypass the section affected. Material excavated from the banks or from the earthworks will not be stockpiled temporarily or permanently in a position where it may obstruct the natural flow of the water. These are considered further within **Chapter 18 – Water Environment and Flood Risk (Volume II)**.

~~3.6.62.~~3.6.52. Where this method is proposed, dams will be positioned both upstream and downstream of the crossing and sump pumps put in place to carry water from the upstream side to the downstream side The discharge hose will be directed through a filtering medium to limit silt carry over or bed disturbance before the pumped water is returned to the watercourse. Where ecological sensitivities require, the pumps would be fitted with screens so that species are not caught in the

pump. This is further discussed in **Chapter 9 – Biodiversity (Volume II)**.

~~3.6.63.~~3.6.53. Risks of pump breakdown, localised erosion and flood risks due to exceedance of flow will be controlled via regular monitoring by the Construction Contractor(s). The minor watercourse will be reinstated following completion of the pipe laying operations.

~~3.6.64.~~3.6.54. The Construction Contractor(s) will be responsible for obtaining all required environmental permits, licences and consents from the relevant authorities where required (**D-PD-010** of the **REAC (Document reference: D.6.5.1)**) for works affecting watercourses, dewatering and or/discharges. More information on permits, licences and consents can be found in **Other Consents and Licences (Document reference: D.5.2)**.

Specialist Trenchless Crossings

~~3.6.65.~~3.6.55. Trenchless Installation Techniques will be required at certain locations to avoid disruption to utilities, major highways, railways, watercourses and particular environmental sensitivities, such as ancient woodland.

~~3.6.66.~~3.6.56. These techniques use a machine to drill or 'bore' a hole through the ground from one side of a specific feature (for example, major roads) to the other. Typically, a pit is dug at either end of the trenchless section where the machinery will be located, creating an entrance and exit pit. All entrance and exit pits will be returned to original use following completion of the construction process.

~~3.6.67.~~3.6.57. There are various Trenchless Installation Techniques available that will be confirmed at the Detailed Design stage. The choice of technique at any one location is dependent on a number of site-specific factors including ground conditions, topography, the space available for pipe stringing either side of the obstruction, and the sensitivity of the obstruction to potential settlement. A list of trenchless crossings is provided in **Appendix 3.1 – Table of Trenchless Crossings (Volume III)**. **Figure 3.2 – DCO Proposed Development (Volume IV)** and provides the indicative location of the trenchless crossings.

~~3.6.68.~~3.6.58. 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 by the Construction Contractor(s) once the Detailed Design has been completed, and so a worst case out of those three has been assessed in the ES. A summary of these three techniques is provided in **Table 3.2** and illustrations are provided in **Inserts 3.4-3.6**.

~~3.6.69.~~3.6.59. At the River Dee, the trenchless crossing technique has been assumed to be either micro-tunnelling or HDD only (auger boring has not been assessed). For both techniques at this location only, in addition to **Table 3.2**, the following parameters would apply~~At the River Dee, the trenchless crossing technique has been assumed to be either micro-tunnelling or HDD only (auger boring has not been assessed). For both techniques at this location only, in addition to Table 3.2, the following parameters would apply~~:

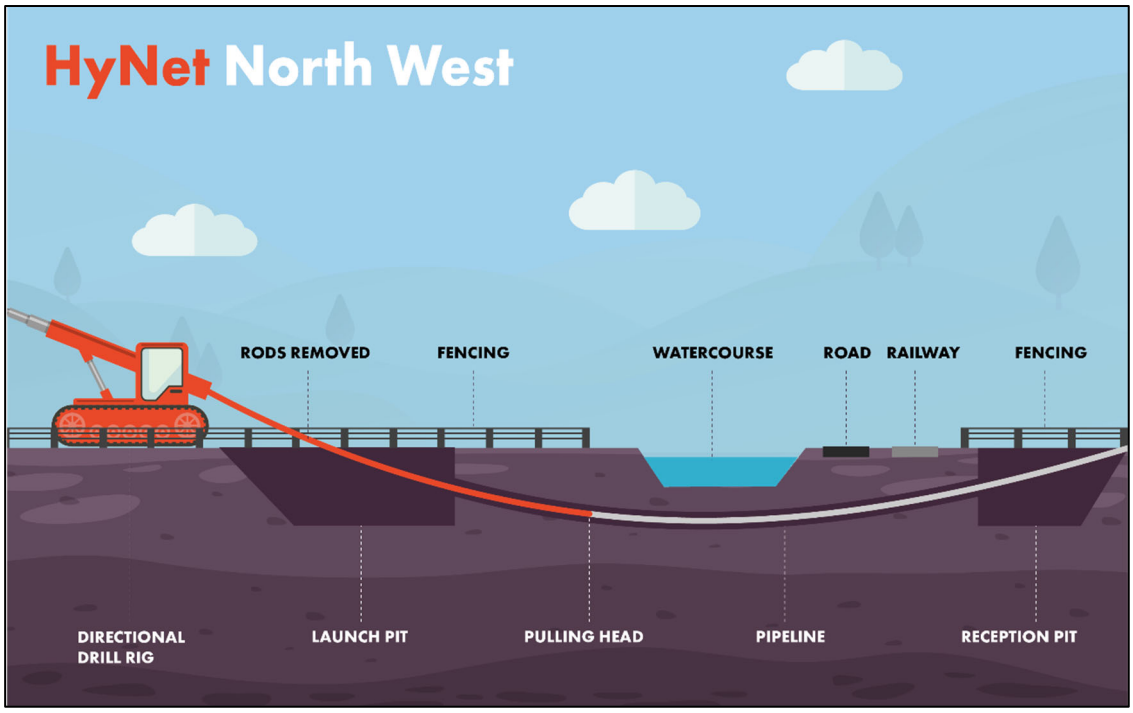
- Entrance and exit pits will be located at least 16m from the embankments~~Entrance and exit pits will be located at least 16m from the embankments~~.
- The trenchless crossing depth will be a minimum of 15m for HDD and a minimum of 8m for micro-tunnelling~~The trenchless crossing depth would be a minimum of 15m~~.
- Compounds would be a maximum size of 50 m x 50m ~~Compounds would be a maximum size of 50 m x 50m~~.

Table 3.2 – Summary of Trenchless Installation Techniques

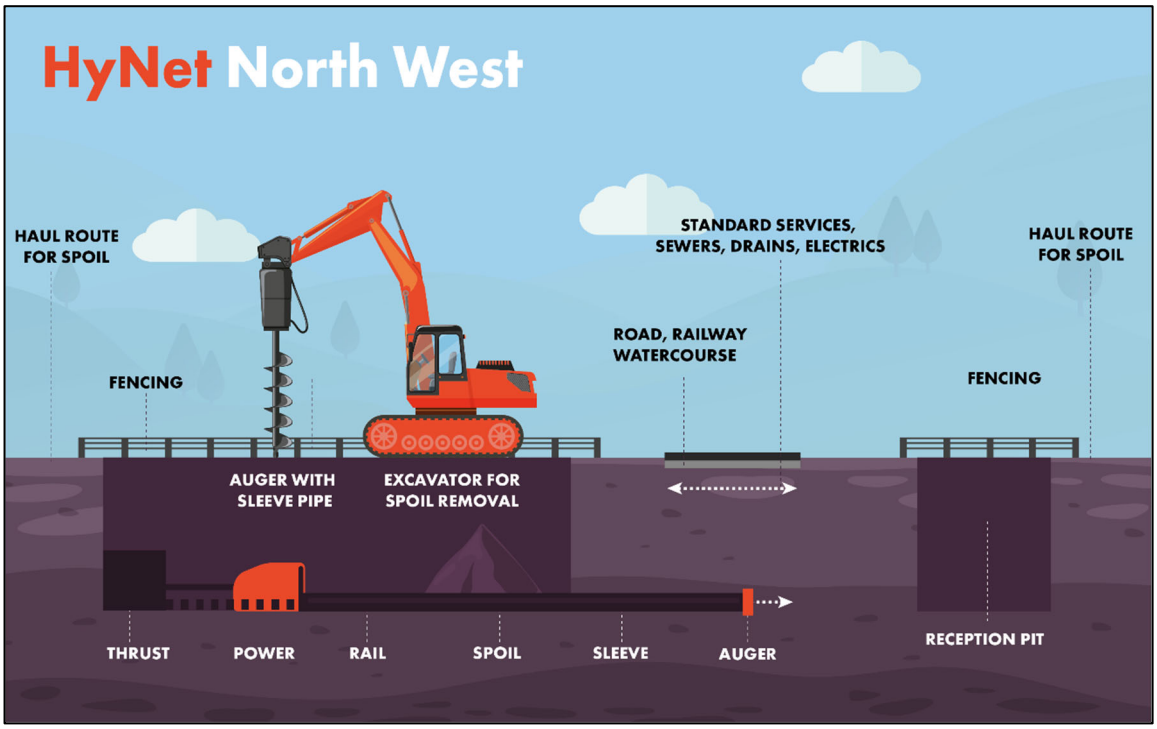
Crossing Method	HDD	Auger Boring (GAB and UAB)	Micro-tunnelling
Typical Use	• Where potential for ground settlement is not critical (such as under rivers). • Areas with stable ground conditions. • Most suitable for small bore crossings, such as for the 20” diameter Ince AGI to Stanlow AGI Pipeline or the FOC. • Long distance crossings.	• Where short crossings are required underneath an obstacle that is not sensitive to ground settlement (e.g. minor roads or small watercourses). • Used over short distances at shallow depths. • GAB used in highly congested areas where the line and level of the crossing requires greater accuracy.(e.g. crossings underneath existing underground utilities).	• Where surface infrastructure is sensitive to settlement (e.g. Railways and motorways) as it gives the best guarantee of little or no settlement. • Areas with changeable or wet ground conditions not ideally suited to other methods.
Entrance and Exit Pit sizes	• Large stringing out area required as the pipe is fabricated to the whole length of the crossing before it is installed. This means the working areas for pipeline stringing are usually as large as the crossing length.	• The pit size is determined by the crossing length. For assessment purposes, the EIA has used Entrance Pits of approximately 8m x 4m and Exit Pits of 4m x 4m.	• The entrance and exit pits are not dependant on the crossing length so are often narrower than Auger bore techniques.
Methodology	• Pipeline is bored under the crossing to emerge at a target point on the opposite side. A large area of temporary land take is required on either side of the proposed crossing to accommodate the equipment,	• Entrance and exit pits are constructed at each end of the tunnel by sheet piling or a concrete sleeve. • GAB equipment is used to push the pipe through the crossing by pushing against	• Entrance and exit shafts are constructed at each end of the tunnel by trench box, sheet piling or sacrificial concrete rings.

Crossing Method	HDD	Auger Boring (GAB and UAB)	Micro-tunnelling
	drilling fluid management system and laydown area for the pipe. • A track mounted HDD boring machine passes a series of drills and reamers extending into the ground from the entrance pit until it reaches the exit pit. • HDD uses bentonite, a clay-based drilling fluid which mixes with drill cuttings arisings to form a slurry. The used slurry is pumped back to the drill launch area where it is filtered and recirculated once again. Once the crossing has been completed, the bentonite will be disposed of appropriately.	the entrance pit walls to apply a thrust and torque reaction to the pit. • UAB equipment is similar to GAB but driven from a long thrust entrance pit to the reception . • The pipe is pre-welded and pushed through as the boring head progresses.	• 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. • Micro-tunnelling uses bentonite as a drilling fluid.

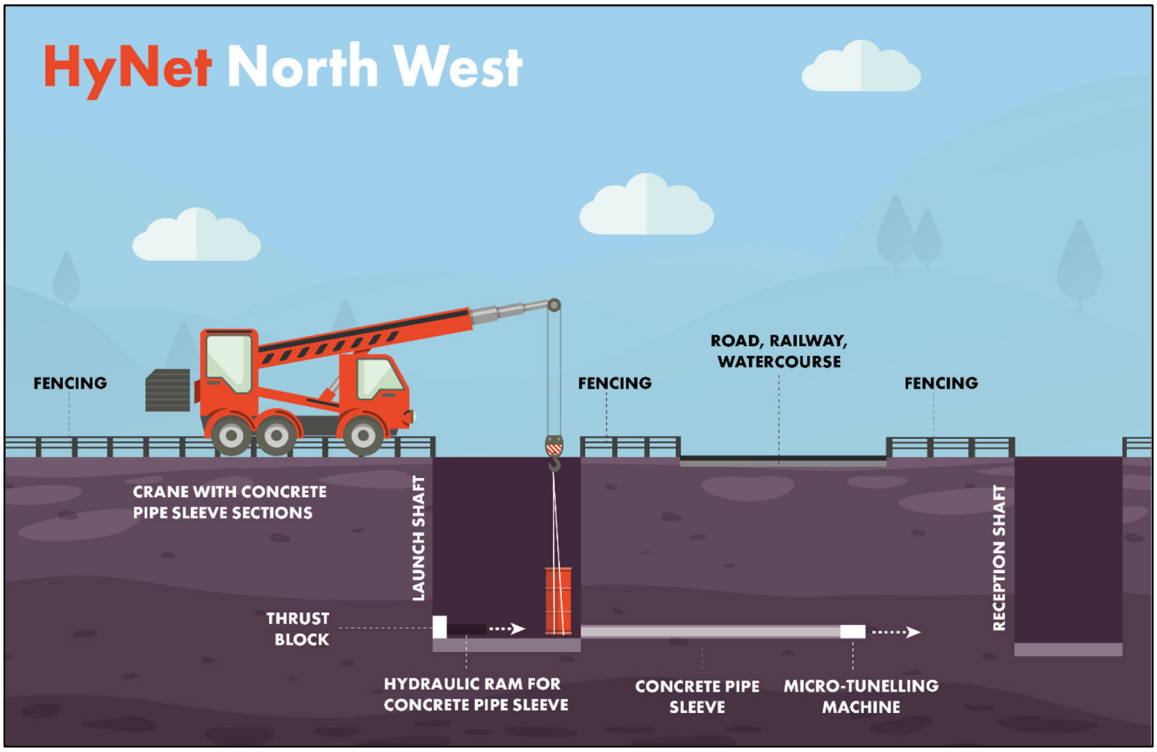
Insert 3.4 - Illustration of HDD Technique



Insert 3.5 - Illustration of Auger Bore Technique



Insert 3.6. Illustration of Micro-tunnelling Technique



ABOVE GROUND INSTALLATION AND BLOCK VALVE STATION INSTALLATION

~~3.6.70.~~3.6.60. Construction of the AGI and BVS sites is anticipated to involve the following sequence of typical activities:

- Pre-construction activities as described in **paragraph 3.6.4** (for example, the formation of compound and material stores);
- Construction of an access road if required, or upgrade of an existing track where possible;
- Erection of secure fencing for construction works;
- Earthworks to establish foundation levels;
- Formation of plant foundation bases and above ground structures;
- Installation of pipework, electrical, instrumentation and control equipment (including E&I Kiosks) and associated infrastructure
- Permanent connections to electrical and telecommunications infrastructure; and
- Final civil works and perimeter reinstatement, landscape works and removal of temporary infrastructure.

~~3.6.71.~~ The layout of each AGI is bespoke, however, there are common features across all sites which will allow a degree of continuity during the construction process. It is envisaged that the construction of the AGIs and BVSs will be co-ordinated with the laying of the underground pipework.

~~3.6.72.~~3.6.62. Permanent structures will be installed on shallow pad foundations with the exception of Ince AGI, which is likely to need to be piled due to the soft soils and peat present in the area. All peat will be handled and stored in line with a Peat Management Plan to be produced by the Construction Contractor(s) as included as a Requirement of the **Draft DCO** (**Document reference: D.3.1**). An **Outline Peat Management Plan (Document reference: D6.5.4.2)** has been prepared as part of the DCO Application**.** The E&I Kiosks will be pre-assembled as far as reasonably practical, but are assumed to be assembled on site.

3.6.63. Installation of the BVSs located along the Flint Connection to PoA Terminal Pipeline will require cleaning and depressurising of the pipeline ahead of the construction works (as part of cessation of natural gas usage) required to install sections of Tie-In pipeline that connect the BVSs.

Embedded Pipe Bridge

3.6.64. Construction of the embedded pipe bridge option is anticipated to involve the following sequence of activities:

- Site establishment – surface preparation for site access and temporary security fencing
- Temporary diversion of watercourse
- ground profiling and soil stabilisation
- construction of bridge abutments
- lifting and installation of pipe bridge sections
- Backfill and Pipeline installation
- Reinstatement of land and watercourse

Temporary Diversion & Crossing of the Watercourse

3.6.65. The watercourse will need to be temporarily diverted around the works for the duration of construction. The preferred option is to culvert the watercourse such that the bedrock is not damaged, allow vehicles to cross, and to catch any construction debris. Sandbags will be placed at either end to guide the water, and pumps will be used if necessary for any overflow.

Ground profiling and soil stabilisation

3.6.66. The south east bank of Alltami Brook shows evidence of landslips so slope stabilisation works may be required. This may be achieved by re-profiling the ground levels to reduce slope angle, or by soil stabilisation. Methods for soil stabilisation, soil pinning or geotextile reinforcement shall be analysed during detailed design, and a suitable method shall be utilised.

Abutment Construction

3.6.67. The intention is to construct the abutments on the bedrock, although this will be confirmed at detailed design stage after ground investigations have been

carried out to determine the depth and quality of the bedrock. If the bedrock is not confirmed to be of a sufficient depth or quality, piling may be necessary and further studies would be conducted to inform the piling design.

Bridge Construction

3.6.68. The pre-cast bridge sections will be installed on the abutments using cranes. A cast in-situ slab may be required to connect the bridge sections together and act as a supporting platform for the soils and side wall sections.

Backfill and Pipeline installation

~~3.6.73.~~3.6.69. The embedded pipe bridge shall be partially filled with site won soils or imported granular backfill, the pipeline would then be installed and the final backfilling to the final soil level. Upon completion of backfilling and restoration, topsoil or organic surface material shall be returned to areas from where it was removed.

FIBRE OPTIC CABLE INSTALLATION

~~3.6.74.~~3.6.70. The FOC that runs along the Ince AGI to Stanlow AGI Pipeline and Stanlow AGI to Flint AGI Pipeline will be installed within the same trench as the pipeline for open-cut trench sections and will be installed during the backfilling stage.

~~3.6.75.~~3.6.71. For trenchless crossings, the FOC will be installed via a second smaller dedicated trenchless crossing adjacent to the main trenchless crossing, if it cannot be installed within the same trenchless crossing as the pipeline.

PRE-COMMISSIONING

~~3.6.76.~~3.6.72. Following the installation of the Newbuild Carbon Dioxide Pipeline, pre-commissioning activities of the pipeline system will determine the structural integrity of the pipeline. The pre-commissioning of the pipeline will likely be undertaken in sections of several kilometres at a time.

~~3.6.77.~~3.6.73. 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.

~~3.6.78.~~3.6.74. The source of the water will be from either a commercial standpipe, water tanker, new water abstraction (subject to obtaining an abstraction licence from the relevant authority) or, where practicable, water re-used from previously tested sections to reduce the total water use.

~~3.6.79.~~3.6.75. The total expected volume of water required for hydrostatic testing the entire length of the Stanlow AGI to Flint AGI Pipeline section is approximately 23,000 m^3. This is approximately 720 m^3 of water per kilometre of pipeline.

~~3.6.80.~~3.6.76. 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 tankered away. The viability of each discharge option will be assessed

at various locations along the pipeline route and, where required, relevant discharge licences obtained.

~~3.6.81.~~3.6.77. The pipeline will then be dried and filled with nitrogen until commissioning.

~~3.6.82.~~3.6.78. For the BVSs proposed along the Flint Connection to PoA Terminal Pipeline, it is proposed that only the sections of pipe which connect the new BVS to the existing pipeline are tested, via the same method.

REINSTATEMENT

~~3.6.83.~~3.6.79. Any chemically/physically suitable surplus material from trench excavations will be beneficially reused on site by spreading it across the Working Width before the topsoil is reinstated on a field-by-field basis. Any material that does need to be removed from site would likely be beneficially reused through measures put in place through the MMP that will be produced by the Construction Contractor(s).

~~3.6.84.~~3.6.80. All watercourse banks, sides of drainage ditches, and all open cut ground road crossing will be backfilled. Each layer will be thoroughly compacted by suitable compacting equipment to provide a good bond between the undisturbed sides of the trench and the new backfill material. Final bank reinstatement may require further measures to stabilise the banks and prevent erosion.

~~3.6.85.~~3.6.81. The subsoil will be ripped prior to topsoil placement if compaction has occurred. Topsoil will be spread in such a way as to ensure that it does not become compacted. All surplus construction materials will be removed on completion of the work.

~~3.6.86.~~3.6.82. Following reinstatement of soil and subsoil, final restoration of the Working Width will commence. Restoration activities will include reseeding of pastureland and reinstatement of field boundaries (e.g. installing permanent fences and suitable hedgerow species replanted).

~~3.6.87.~~3.6.83. In urban areas or where road crossings have occurred, reinstatement will be completed in accordance with the Department for Transport's Reinstatement of Openings in Highways (RSOH) **(Ref. 3.5).**

EQUIPMENT AND MATERIALS

Types of Plant and Equipment

3.6.84. A variety of different types of plant and equipment will need to be deployed during the construction of the DCO Proposed Development.

~~3.6.88.~~3.6.85. Clearance of the working width specifically at New Bridge Farm to remove the slurry tank, will require the use of plant and equipment including a saw, dumper truck, roller, excavator, crane and a small diesel-powered generator for hydraulic jacks.

~~3.6.89.~~3.6.86. The installation of the pipeline will require use of plant and equipment including but not limited to welders, air compressors, excavators, excavator mounted breakers, tipper lorries, haulage lorries, automatic welding machines, angle grinders, vibratory piling rigs, auger units, HDD units, and concrete pumps.

~~3.6.90.~~3.6.87. The earthworks associated with the installation of the pipeline will require use of plant and equipment including excavators, water pumps, bulldozers, dumper trucks, vibratory rollers, and tipper lorries.

~~3.6.91.~~3.6.88. Indicative information on the type and number of major plant and equipment required as part of the DCO Proposed Development can be found in **Appendix 3.2 – Indicative Plant and Equipment (Volume III)**.

Oils, Fuels and Chemicals

~~3.6.92.~~3.6.89. Any facilities for the storage of oils, fuels or chemicals will be sited on impervious bases and surrounded by impervious bund walls The volume of the bunded compound will be 110% of the capacity of the tank, all filling points, gauges, vents and sight glasses will be located within the bund. Associated pipework will be located above ground and protected from accidental damage. All filling points and tank overflow pipe outlets will be detailed to discharge downwards into the bund. Refuelling will be supervised at all times, preferably done on an impermeable surface or with suitable ground protection (**D-LS-004** of the **REAC (Document reference: D.6.5.1)**).

~~3.6.93.~~3.6.90. It is estimated that the peak fuel consumption per day of the plant and equipment required to construct the pipeline will be approximately 12,500 L/day. For the AGIs and BVSs, the daily peak fuel consumption is estimated to be 200 L/day.

Waste and Material Management Planning

~~3.6.94.~~3.6.91. Any waste materials generated during the DCO Proposed Development will be disposed of satisfactorily and in accordance with Section 34 of the Environment Act 2021 (**Ref. 3.6**) and NRW relevant guidance on waste management. The Construction Contractor(s) will be responsible for obtaining all required environmental permits, licences and consents from the relevant authorities where required (**D-PD-010** of the **REAC (Document reference: D.6.5.1)**).

~~3.6.95.~~3.6.92. A waste hierarchy will be adopted, in dealing with waste. This is expressed as “Remove/avoid, Reduce, Reuse, Recycle, Recover, Treatment, Disposal”. The avoidance of waste is the preferred option. Disposal will occur when all reasonable steps have been made to follow the hierarchy.

~~3.6.96.~~3.6.93. Excess subsoil and topsoil will be re-used on site where suitable or taken to an offsite recycling facility in accordance with an agreed MMP produced by the Construction Contractor(s). Topsoil for re-use will be stored separately on-site.

~~3.6.97.~~3.6.94. No excavated material from the trenches will be placed outside of the demarcated working area (**D-PD-019** of the **REAC (Document reference: D.6.5.1))**. All soil will be handled and stored in line with the Soil Management Plan to be produced by the Construction Contractor(s) as included as a Requirement of the **Draft DCO** (**Document reference: D.3.1**). An Outline Soil Management Plan (**Document reference: D6.5.4.1)** has been prepared and submitted with the DCO Application.

~~3.6.98.~~3.6.95. Spoil banks will be designed to not interfere with natural drainage. Adequate openings will be provided to allow normal drainage and passage of vehicles where this is necessary.

~~3.6.99.~~3.6.96. Materials which will be removed as part of construction include waste pipe sections and fittings, cables and associated fittings, pallets and packing cases, general construction consumables and hazardous waste such as paints and solvents. The method for disposal will be set out in the Waste Management Plan that will be produced by the Construction Contractor(s) (**D-MW-002** of the **REAC (Document reference: D.6.5.1)**). Further details can be found in **Chapter 14 – Materials and Waste (Volume II)**.

~~3.6.100.~~3.6.97. If, during construction/excavation works, any contaminated or hazardous material is revealed, the movement of such material either on or off-site will be done in consultation with the relevant authority (NRW (Wales) or EA (England)).

~~3.6.101.~~3.6.98. Waste will be segregated by type on site using separate labelled skips.

TRAFFIC AND ACCESS MANAGEMENT

~~3.6.102.~~3.6.99. An Outline Construction Traffic Management Plan (OTMP) (**Document reference: 6.5.3)** has been prepared in support of the ES. This provides details of procedures for construction related traffic, including:

- Construction traffic routes;
- Worker hours and shift patterns;
- Parking; and
- Abnormal Indivisible Loads.

~~3.6.103.~~3.6.100. To ensure that any impacts on major highways and trunk roads during construction will be limited, the major equipment and materials required during construction will be transported outside of peak periods. Further detail is provided within **Chapter 17 - Traffic and Transport (Volume II)**.

3.6.101. There will be open trenches across minor roads and tracks which will either be managed by road closures and temporary diversions or traffic management. Disruption in these areas is not likely to exceed 2-3 weeks.

3.6.102. Out of the 19 crossings:

- Seven crossings (TRS-03, TRS-04, TRS-07, TRS-10, TRS-13, TRS-16 and TRS-19) are considered to have low potential for adverse environmental impacts.
- Ten crossings (TRS-11, TRS-15, TRS-21, TRS-22, TRS-23, TRS-25, TRS-33, TRS-38, TRS-40 and TRS-42) are considered to have low potential for adverse environmental impacts. Appropriate traffic management measures are outlined within the **OCTMP (Document Reference: D.6.5.3)**.
- Two crossings (TRS-12 and TRS-26) have potential for adverse environmental impacts due to the presence of possible sensitive receptors. These two crossings will be subject to pre-construction surveys and above ground construction access will only proceed if, having regard to the surveys and the judgement of the ECoW, it is concluded that the surveys demonstrate that there will be no significant adverse environmental impact on receptors. This would include confirming that there are no likely adverse effects on users of the PRoWs. The surveys would be part of the CEMP which would be approved by the local authority (**D-PD-020** of the **REAC**)

~~3.6.105.~~3.6.103. An Interim Workers Travel Plan (IWTP) (**Appendix 17-14**) has been submitted with the DCO Application which focuses on reducing the traffic impacts associated with construction workers travelling to and from sites.

~~3.6.106.~~3.6.104. All designated Public Rights of Way (PRoW) have been identified, and any potential temporary closures applied for are set out in the DCO application. All designated PRoW crossing the working area will be managed, including National Trails, with access closed and wherever possible diverted. Further information is available in **Chapter 16 – Population and Human Health** and **Chapter 17 – Traffic and Transport (Volume II)**.

CONSTRUCTION SCHEDULE AND WORKING HOURS

~~3.6.107.~~3.6.105. Subject to the granting of the DCO, the construction of the DCO Proposed Development is anticipated to commence in 2024. From the commencement of the pre-construction activities to completion of commissioning, the construction programme is expected to last approximately 16 months. This is shown in the preliminary construction schedule provided in **. Sealand** Road Centralised Compound would be used as alternative if Wood Farm Centralised Compound cannot be used.

~~3.6.108.~~3.6.106. **Table 3.3**. This schedule will be refined at the Detailed Design stage. Although 8 centralised compounds are being assessed in the EIA, only 7 are expected to be implemented to facilitate construction of the DCO Proposed Development. Sealand Road Centralised Compound would be used as alternative if Wood Farm Centralised Compound cannot be used.

Table 3.3 - Preliminary Construction Schedule

Proposed Element	Start	Finish
Section 1		
Stanlow Centralised Compound (Work Number 6B)	April 2024	June 2025
Ince AGI	July 2024	November 2024
Stanlow AGI	November 2024	March 2025
Section 2		
Picton Lane Centralised Compound (Work Number 15A)	April 2024	July 2025
Chorlton Lane Centralised Compound (Work Number 19A)	April 2024	July 2025
Rock Bank BVS	June 2024	October 2024
Section 3		
Sealand Road Centralised Compound (Work Number 30A)	April 2024	July 2025
Mollington BVS	June 2024	October 2024
Section 4		
Wood Farm Centralised Compound (Work Number 30D)	April 2024	July 2025
River Dee Centralised Compound (Work Number 31A)	April 2024	July 2025
Section 5		
Shotton Lane Centralised Compound (Work Number 41A)	April 2024	July 2025
Northop Hall Centralised Compound (Work Number 44C)	April 2024	July 2025
Northop Hall AGI	January 2025	May 2025
Aston Hill BVS	June 2024	October 2024
Section 6		
Flint AGI	May 2024	September 2024

Proposed Element	Start	Finish
Section 7		
Cornist Lane BVS	October 2024	February 2025
Babell BVS	October 2024	February 2025
Pentre Halkyn BVS	October 2024	February 2025

~~3.6.109.~~3.6.107. To ensure that the construction programme is minimised, works will be programmed as a series of concurrent work packages via multiple teams working simultaneously along the Newbuild Carbon Dioxide Pipeline route. A work package may focus on a specific area or location where a group of construction workers will carry out a particular aspect of the main pipeline construction activities, including topsoil stripping, trench excavation, pipe installation and backfilling of trenches.

~~3.6.110.~~3.6.108. The Construction Contractor(s) will be committed to promoting the use of local workforce and suppliers, wherever practicable. Core working hours are proposed to be from 08.00 to 18.00 on weekdays (excluding bank holidays) and from 08.00 to 13.00 on Saturdays~~The Construction Contractor(s) will be committed to promoting the use of local workforce and suppliers, wherever practicable. Core working hours are proposed to be from 08.00 to 18.00 on weekdays (excluding bank holidays)~~.

~~3.6.111.~~3.6.109. 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.

~~3.6.112.~~3.6.110. Core working hours may vary at locations where trenchless crossings are proposed according to the length of the pipe being installed, ground conditions, and the technique used. In such cases, continual 24 hour working may be required to allow the tunnelling activities to be completed as safely and quickly as possible. The duration of 24 hour working at the majority of trenchless crossings is not likely to exceed a period of days, though the longer crossings in difficult ground conditions are expected to last up to four weeks. This is expected to be only at six specific crossings:

- TRS 01: Hapsford railway line (and spur to Encirc glass factory)
- TRS 02: A5117 (north of M56 Chester Services)

- TRS 28: River Dee
- TRS 31/32: Chester Road
- TRS 38: Church Lane
- TRS 37: A494

~~3.6.113.~~3.6.111. During the Construction Stage, the average workforce associated with the pipeline installation work is anticipated to be approximately 230, with a peak workforce of approximately 630. The total anticipated pipeline construction works hours is approximately 1,000,000.

~~3.6.114.~~3.6.112. Scheduling of the construction of the AGIs and BVSs will be aligned and integrated with the overall pipeline construction schedule, and thus completed within the 65 weeks of the main schedule. There will be an estimated peak of 34 direct people working at each of the BVS and AGI locations.

~~3.6.115.~~3.6.113. Activities will be timed to reduce impacts on ecological receptors, e.g., nesting periods of birds or spawning periods for reptiles and amphibians. The ecological surveys will be used as a basis for planning of specific activities. Additional detail can be found in **Chapter 9 – Biodiversity (Volume II)** and the **REAC (Document reference: D.6.5.1).**

3.7. OPERATION AND MAINTENANCE

PIPELINE OPERATING PROCEDURE

3.7.1. The Detailed Design of the Newbuild Carbon Dioxide Pipeline will be in accordance with relevant industry codes of practice, standards and recommended practice and the requirements of the Pipeline Safety Regulations 1996. The Applicant will develop an Operations and Maintenance Environment Management Plan, as included as a Requirement of the **Draft DCO** (**Document reference: D.3.1**), in line with their Environmental Management System which is ISO 14001 certified (**D-PD-012** of the **REAC, Document reference: D.6.5.1**). Landscape and ecology will be specifically controlled by the Landscape and Ecology Management Plan, as included as a Requirement of the **Draft DCO** (**Document reference: D.3.1**), which will be prepared in accordance with the **Outline Landscape and Ecology Management Plan, (Document reference: D.6.5.10)** which has been submitted alongside the DCO Application.

3.7.2. Monitoring will be carried out via the Integrated Control and Safety Systems (ICSS) at the PoA Terminal, which is subject to being granted planning permission for the redevelopment through the TCPA Application.

3.7.3. Emergency shut down valves will be located at the AGIs and BVSs, with an Emergency Response Plan and Major Accident Prevention Document implemented by the Applicant.

3.7.4. Routine operations at the AGIs and BVSs are not anticipated to produce notable noise emissions and there would be no on-site power generating equipment. Each E&I Kiosk would have a single roof-mounted fan to aid air cooling of the equipment.

3.7.5. Should there be a need to isolate sections of the Newbuild Carbon Dioxide Pipeline or Flint Connection to PoA Terminal Pipeline for operational reasons, this would be performed at the AGIs and BVSs via remote operation. However, the AGIs and BVSs would also allow for in-person operation, should this be needed.

3.7.6. Pipeline leak detection technology will be installed as part of the Newbuild Carbon Dioxide Pipeline and Flint Connection to PoA Terminal Pipeline and is designed for the early warning and remote identification of major leakages. CO_2 point gas detectors will also be installed externally at each AGI and BVS.

PERMANENT RIGHTS CORRIDOR

3.7.7. The Newbuild Carbon Dioxide Pipeline would be protected by restrictions placed on the land over and immediately around it, in a corridor along the pipeline alignment with a maximum width of 24.4 m. These will either be included in the lease for the pipeline or imposed as restrictive covenants for the benefit of the subsoil land interest within which the pipeline is situated. These restrictions will include preventing activities which could damage the pipeline such as constructing over it or planting trees over it.

3.7.8. Rights to take access and carry out works of inspection and maintenance of the Newbuild Carbon Dioxide Pipeline will also be taken over the same corridor. These rights will be in the form of an easement or acquisition of rights and would not extend over private dwellings or gardens.

CATHODIC PROTECTION

3.7.9. A CP system would be used to protect the pipeline against corrosion. The CP system is buried underground, with the exception of associated CP transformer rectifier cabinets and CP test posts. Further details on the CP system are provided in **Section 3.5**.

3.7.10. Readings of the CP test posts would be taken by operational staff via hand-held equipment.

OPERATIONAL ANNUAL FLOW

3.7.11. The annual flow of CO_2 to be transported by the Newbuild Carbon Dioxide Pipeline and Flint Connection to PoA Terminal Pipeline is 4.5 $MtCO_2/yr$; however actual use levels will be dictated by the number of CO_2 capture plants connected to the DCO Proposed Development, and the amount of CO_2 each plant would capture. The annual CO_2 flow would increase over time as more Upstream Emitters are connected to the Newbuild Carbon Dioxide Pipeline. It

has been assumed for assessment purposes that full capacity would be reached in 2027 and remain constant onwards over the lifespan of the DCO Proposed Development. Any increase of the CO_2 annual flow beyond 4.5 $MtCO_2$/yr as part of the Project would require further consent.

INSPECTION

3.7.12. Once the DCO Proposed Development is operational, it will not require permanent staffing or personnel presence. The AGIs and BVSs do not include any major machinery; facilities comprise mainly of piping and static equipment elements with isolation valves, instruments, and minor utilities. Routine maintenance of the AGIs and BVSs is expected to be minor and consist of lubrication, replacement of seals and calibration of instruments.

~~3.7.12.~~3.7.13. The embedded pipe bridge option (if taken forward) will require inspection at regular intervals and after any extraordinary events (e.g. storm events) but no regular maintenance works are expected.

~~3.7.13.~~3.7.14. A routine programme of inspection and maintenance will be undertaken in accordance with best practice and regulatory requirements. **Table 3.4** sets out the anticipated maintenance and inspection activities and their frequencies.

Table 3.4 – Routine maintenance Activities and Frequency

Infrastructure	Maintenance / Inspection Activity	Indicative Frequency
Newbuild Carbon Dioxide Pipeline and Flint Connection to PoA Terminal Pipeline	Vantage point survey including pipeline easement.	Weekly
	Aerial survey using helicopters.	Fortnightly
	Electrical equipment, safety and protection devices and status checks.	Every six months
	Complete line walk.	Annually
	Coating defect survey.	Every four years
	Pipeline in-line inspection (using PIG).	An initial baseline survey upon commissioning and then every five years.
CP system	Check the operation and condition of the	Monthly

Infrastructure	Maintenance / Inspection Activity	Indicative Frequency
	transformer rectifier units.	
	Measure drain-point potential, the current of drainage stations and Alternating Current (AC) levels from the highest select points along the pipeline system.	Monthly
	Measure the: • Electrical continuity from the bonding devices and grounding systems • Settings and function from the safety and protection devices; and • Instant-off potentials at all test posts.	Twice annually
	Close interval potential survey and Direct Current (DC) voltage gradient survey	Typically, every four years.
AGI and BVS	Security visit	Weekly
	Maintenance visit	Quarterly
	Visual survey of valve surface works, instruments, and electrical equipment	Every three months
	Stroke testing and lubrication of valves	Every 12 months
	HIPPS testing	Every 12 months
	PIG launcher/receiver inspections	External – 12 months Internal – 24 months

Infrastructure	Maintenance / Inspection Activity	Indicative Frequency
Alltami Brook Embedded Pipe Bridge option	General (visual) inspection	Every 2 years
	Principal (close visual) inspection	Every 6 years

~~Infrastructure~~	~~Maintenance / Inspection Activity~~	~~Indicative Frequency~~
~~Newbuild Carbon Dioxide Pipeline and Flint Connection to PoA Terminal Pipeline~~	~~Vantage point survey including pipeline easement.~~	~~Weekly~~
	~~Aerial survey using helicopters.~~	~~Fortnightly~~
	~~Electrical equipment, safety and protection devices and status checks.~~	~~Every six months~~
	~~Complete line walk.~~	~~Annually~~
	~~Coating defect survey.~~	~~Every four years~~
	~~Pipeline in-line inspection (using PIG).~~	~~An initial baseline survey upon commissioning and then every five years.~~
~~CP system~~	~~Check the operation and condition of the transformer rectifier units.~~	~~Monthly~~
	~~Measure drain-point potential, the current of drainage stations and Alternating Current (AC) levels from the highest select points along the pipeline system.~~	~~Monthly~~
	~~Measure the:~~ ~~• Electrical continuity from the bonding devices and grounding systems~~ ~~• Settings and function from the safety and protection devices; and~~ ~~• Instant-off potentials at all test posts.~~	~~Twice annually~~
	~~Close interval potential survey and Direct Current (DC) voltage gradient survey~~	~~Typically, every four years.~~
~~AGI and BVS~~	~~Security visit~~	~~Weekly~~

~~Infrastructure~~	~~Maintenance / Inspection Activity~~	~~Indicative Frequency~~
	~~Maintenance visit~~	~~Quarterly~~
	~~Visual survey of valve surface works, instruments, and electrical equipment~~	~~Every three months~~
	~~Stroke testing and lubrication of valves~~	~~Every 12 months~~
	~~HIPPS testing~~	~~Every 12 months~~
	~~PIG launcher/receiver inspections~~	~~External – 12 months~~ ~~Internal – 24 months~~

~~3.7.74.~~3.7.15. The finalised inspection and maintenance frequency for the DCO Proposed Development will be dependent upon further design work including an integrity management strategy, safety integrity level assessment and threat assessment.

TEMPORARY VENTING

~~3.7.75.~~3.7.16. During normal operation, any emission of CO_2 will be limited to planned maintenance activities.

~~3.7.76.~~3.7.17. Provision for planned temporary venting of CO_2 would be present at Ince, Stanlow and Flint AGIs. There would be no provision for temporary CO_2 venting at Northop Hall AGI or any of the BVSs.

~~3.7.77.~~3.7.18. Temporary CO_2 venting would take place via the installation of a temporary vent stack at the AGIs. This would be removed once the temporary venting activity has been completed.

~~3.7.78.~~3.7.19. A summary of the venting activities is provided below. Further information is contained within **Chapter 6 - Air Quality (Volume II),** and quantities of CO_2 emissions are provided in **Section 10.9** of **Chapter 10 – Greenhouse Gas (Volume II)**.

Routine, Temporary Maintenance Venting

~~3.7.79.~~3.7.20. There are two separate maintenance activities that will require venting at the AGIs: PIG trap venting and manifold venting.

PIG Trap Venting

~~3.7.80.~~3.7.21. During the pipeline in-line inspections, where a PIG is launched/received at the AGIs, there would be a need to vent the PIG trap once it is isolated from the pipeline. This would empty the contents of the trap so that the PIG equipment can be safely entered into/retrieved from the trap.

~~3.7.81.~~3.7.22. This would not be part of the regular, frequent inspection procedure as it is anticipated to be required every five years following commissioning of the DCO Proposed Development.

Manifold Venting

~~3.7.82.~~3.7.23. Manifold venting will take place when extraordinary or repair work is required at the AGIs. This would allow contents of the pipework within the AGIs to be cleared, prior to works taking place. The frequency of manifold venting is likely to be less than once every five years.

Non-Routine, Emergency Maintenance/ Repairs

~~3.7.83.~~3.7.24. The design will limit the need for pipeline depressurisation activities as far as practicable.

FUGITIVE EMISSIONS

~~3.7.84.~~3.7.25. Potential fugitive emissions from the DCO Proposed Development are expected to be minimal because of the limited number of fugitive emission sources. Monitoring and maintenance will be performed on the CO_2 transport facilities to limit fugitive emissions.

~~3.7.85.~~3.7.26. Operating procedures will draw upon industry standard guidance to estimate fugitive emissions for the DCO Proposed Development. This will include:

- Identification of the plant components (valves, vents, flanges etc.) that may cause fugitive emissions;
- Periodic monitoring to check the status of the identified components by using leak detectors;
- Implementation of a leak detection and repair programme to minimise fugitive emissions, for each component for which leakages have been identified; and
- Reporting results of monitoring and repairing activities.

LIGHTING

~~3.7.86.~~3.7.27. Lighting columns will be installed at the perimeter of the AGIs and BVSs, as described in **Section 3.5.** AGIs and BVSs would not be permanently lit; lighting would only operate should there be a security or safety reason (for example, an unexpected need for a maintenance visit during low light conditions).

~~3.7.87.~~3.7.28. The perimeter lighting columns will be directed only into the facility area and will incorporate measures such as louvres and/or barn-doors, to minimise light-spill on the occasions that the lighting is required.

~~3.7.88.~~3.7.29. The exception to this is the Stanlow AGI, which will be permanently lit, due to safety reasons owing to its surrounding industrial context.

~~3.7.89.~~3.7.30. Operational lighting will follow BS EN 12464 (Part 2) (**Ref: 3.2**) and guidance notes from the Institution of Lighting Professionals GN01 (**Ref: 3.3**) and GN08 (**Ref: 3.4**). The Applicant will prepare a Lighting Plan, which will detail the

operational lighting requirements and associated mitigation (**D-PD-014** of the **REAC, Document reference: D.6.5.1**.

OPERATIONAL STAFF AND EMPLOYMENT

~~3.7.90.~~3.7.31. The DCO Proposed Development will operate without the need for any permanent on-site staff. The AGIs and BVSs will generally be operated remotely. All inspection and maintenance visits to the AGIs and BVSs will be made by personnel working at the PoA Terminal.

~~3.7.91.~~3.7.32. Approximately 1 Full Time Equivalent (FTE) technician role is anticipated to be created as a result of the DCO Proposed Development. This will be split across various engineering disciplines required to undertake the operational tasks.

~~3.7.92.~~ Additionally, it is anticipated that approximately 0.25 FTE security guard role will be required. In addition, there will be roles associated with the off-site pipeline surveys and intelligent pigging. For intelligent pigging there is anticipated to be six personnel required for approximately 1-2 weeks per section of pipeline.

3.8. DECOMMISSIONING

3.8.1. The DCO Proposed Development is permanent but its useful life is linked to the capacity of the offshore reservoirs. The Newbuild Carbon Dioxide Pipeline is designed to a life span of 40 years and associated infrastructure designed to 25 years. When the DCO Proposed Development ceases to be operational and reaches the end of its useful life, the Newbuild Carbon Dioxide Pipeline and Flint Connection to PoA Terminal Pipeline will be decommissioned safely, filled with nitrogen and left in-situ. The basis of assessment for operational life in the ES is 25 years.

3.8.2. Above ground features associated with AGIs, BVSs and Alltami Brook embedded pipe bridge option will be dismantled, cleared and the ground conditions restored to their previous condition. For the purposes of the ES, the method of removal is assumed to be no worse than the construction method. The full details will be developed at the decommissioning stage~~Above ground features associated with AGIs and BVSs will be dismantled, cleared and the ground conditions restored to their previous condition. For the purposes of the ES, the method of removal is assumed to be no worse than the construction method. The full details will be developed at the decommissioning stage~~.

3.8.3. Due to the nature of the DCO Proposed Development, although steps will be taken to clean, vent and drain the pipeline and equipment, there may be contamination by residual chemicals present. The presence of chemicals would be considered in selecting the decommissioning and disposal method.

3.8.4. The CP monitoring system may be kept in place to allow monitoring and ongoing protection against corrosion.

3.8.5. Decommissioning design and works will be undertaken in compliance with all necessary legislation, permits and best practice at that time. This will be set out in the end of life Decommissioning Environmental Management Plan (DEMP) as included as a Requirement of the **Draft DCO** (**Document reference: D.3.1**).

3.9. REFERENCES

- **Ref. 3.1:** BSI PD 8010-1 Pipeline Systems Part 1: Steel pipelines on land- Code of practice
- **Ref. 3.2:** BS EN 12464-2:2014 Light and lighting. Lighting of workplaces. Part 1: Indoor workplaces and Part 2 Outdoor workplaces.
- **Ref. 3.3.:** Institution of Lighting Professionals. (2021). GN01:2021 Guidance Note 1 for the reduction of obtrusive light.
- **Ref. 3.4.:** Institution of Lighting Professionals. (2018). GN08:2018 Bats and artificial lighting in the UK.

- **Ref. 3.5:** Department for Transport (May 2020). Specification for the Reinstatement of Openings in Highways. Available at: https://www.gov.uk/government/publications/specification-for-the-reinstatement-of-openings-in-highways.
- **Ref. 3.6:** HM Government. (2021). The Environment Act 2021.