HyNet North West

ENVIRONMENTAL STATEMENT (VOLUME III)

Appendix 18.3 Water Framework Directive Assessment

HyNet Carbon Dioxide Pipeline DCO

Planning Act 2008

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

Document Reference Number D.6.3.18.3

Applicant: Liverpool Bay CCS Limited

Inspectorate Reference: EN070007

Applicant: Liverpool Bay CCS Limited

English Version

REVISION: A

DATE: September 2022

DOCUMENT OWNER: WSP UK Limited

PUBLIC

QUALITY CONTROL

Issue/Revision	First Issue	Revision 1	Revision 2	Revision 3
Document Reference	D.6.3.18.3			
Revision	A			
Author Name and Sign	FM			
Approver Name and Sign	EI			
Document Owner	WSP			

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1. INTRODUCTION

1.1.1. This Water Framework Directive assessment (WFDa) has been prepared to assess the risks to the water environment posed by the Development Consent Order (DCO) Proposed Development. Each activity associated with the DCO Proposed Development, such as watercourse crossings, culverts, and outfalls, will be assessed against the biological, physico-chemical and hydromorphological quality elements that comprise the WFD.

1.1.2. The purpose of this WFDa is to evaluate the potential operational effects on those WFD water bodies potentially impacted due to the DCO Proposed Development. This includes potential effects to River, Transitional, Artificial and Groundwater WFD water bodies.

1.1.3. The potential construction impacts are also evaluated due to the potential medium to long-term effects they may have on the status of WFD quality elements.

1.2. STUDY AREA

1.2.1. The Study Area spans a 25.2 km corridor from Elton, Cheshire (England) to Flint, Flintshire (Wales). The Study Area and drawings of the DCO Proposed Development are provided in Figure **18.3.1 – WFD Waterbodies (Annex F).**

1.2.2. The DCO Proposed Development could potentially impact those WFD water bodies listed in **Table 1-1 and Table 1-2.**

Table 1.1: WFD water bodies within England potentially impacted by the DCO Proposed Development

River Basin District (RBC)	Management Catchment	Operational Catchment	WFD Water Body
River WFD Water Bodies			
North West	Weaver Gowy	Gowy	Peckmill Brook, Hoolpool Gutter and Ince Marshes (GB112068060330) (hereafter referred to as Ince Marshes)

River Basin District (RBC)	Management Catchment	Operational Catchment	WFD Water Body
			Gowy (Milton Brook to Mersey) (GB112068060250)
			Stanney Mill Brook (GB112068060260)
Dee	Dee	Dee Estuary	Finchetts Gutter (GB111067056930)
			Garden City Drain (GB111067056960)
Non-reportable watercourse (Gale Brook) within Mersey transitional water body GB531206908100)			
Artificial WFD Water Bodies			
North West	North West AWB	Weaver Upper Canals	Shropshire Union Canal, Market Drayton to Ellesmere Port (GB71210133) (hereafter referred to as SUC)
		Manchester Ship and Bridgewater Canals	Manchester Ship Canal (GB71210004)
Transitional WFD Water Bodies			
North West	North West TraC	Mersey Estuary	Mersey (GB531206908100)
Groundwater WFD Water Bodies			

River Basin District (RBC)	Management Catchment	Operational Catchment	WFD Water Body
North West	North West GW	Wirral and Cheshire West Permo-Triassic Sandstone Aq.	Wirral and West Cheshire Permo-Triassic Sandstone Aquifers (GB41101G202600)
Dee	Dee GW	Dee Permo-Triassic Sandstone	Dee Permo-Triassic Sandstone (GB41101G202400)

Table 1.2: WFD water bodies within Wales potentially impacted by the DCO Proposed Development

River Basin District	Management Catchment	Operational Catchment	WFD Water Body
River WFD Water Bodies			
Dee	Dee	Dee Estuary	Sandycroft Drain (GB111067052160)
			Wepre Brook (GB111067056880)
			Swinchiard Brook (GB111067056940)
Western Wales	Clwyd	Clwyd Lower	Wheeler – lower (GB110066059930)
Western Wales	Clwyd	Clwyd Lower	Pant-gwyn (Wheeler) (GB110066059940)
Transitional WFD Water Bodies			
Dee	Dee TraC	Dee Estuary TraC	Dee (N.Wales) (GB531106708200)

River Basin District	Management Catchment	Operational Catchment	WFD Water Body
Coastal WFD Water Bodies			
Western Wales	Western Wales TraC	North Wales	North Wales (GB641011650000)
Groundwater WFD Water Bodies			
Dee	Dee GW	Dee Carboniferous Coal Measures	Dee Carboniferous Coal Measures (GB41102G204800)
		Dee Permo-Triassic Sandstone	Dee Permo-Triassic Sandstone (GB41101G202400)
Western Wales	Western Wales GW	Clwyd Carboniferous Limestone	Clwyd Carboniferous Limestone (GB41001G200300)

1.3. THE DCO PROPOSED DEVELOPMENT

1.3.1. The DCO Proposed Development comprises Above Ground Installations (AGIs), Block Valve Stations (BVSs) and their associated drainage, and both trenched and trenchless crossings for the Newbuild Carbon Dioxide Pipeline.

1.3.2. Through the design development process, potential impacts to the water environment and WFD receptors have been eliminated as far as practicable using a stepwise approach of eliminate, reduce, manage and enhance. Where it has not been feasible to eliminate potential impacts, design development has sought to reduce any impacts and then to provide mitigation for potential impacts. Most of the potential impacts are anticipated during the Construction Stage; further information on the management of those impacts is provided below. In addition, the DCO Proposed Development aims to reinstate habitats where practicable and to deliver 1% minimum net gain on Priority Habitats. Further information is provided in **the Biodiversity Net Gain Report (Document reference: D.6.5.12).**

1.3.3. As part of the DCO Proposed Development, the following activities are required:

CONSTRUCTION STAGE

Trenchless Crossings

1.3.4. The Newbuild Carbon Dioxide Pipeline will be laid beneath some watercourses via trenchless crossing techniques. These techniques use a machine to drill or 'bore' a hole through the ground from one side of a specific feature (for example, major roads) to the other. Typically, a pit is dug at either end of the trenchless section where the machinery will be located, creating an entrance and exit pit. All entrance and exit pits will be returned to original use following completion of the construction process.

1.3.5. There are various methods of trenchless installation available. The choice of technique at any one location will be confirmed at the Detailed Design stage and 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.

1.3.6. Horizontal Directional Drilling (HDD), Auger Boring (Guided (GAB) and Unguided (UAB)) and Micro-Tunnelling are the three types of trenchless installation techniques most likely to be utilised by the Construction Contractor(s) once the Detailed Design has been completed.

Open Cut Crossings

1.3.7. Open Cut Crossings involves excavating a section of the ground to allow the installation and burial of a pipeline. All excavated material would be placed on the top of the pipeline section as far as practicable, therefore, avoiding offsite disposal.

1.3.8. Topsoil would be excavated and stored in accordance with best practice during construction. Pipe sections would be strung out along the corridor adjacent to the eventual trench. Pipes would be welded and undergo Non-Destructive Testing before coating. Excavation of the trench would be performed with standard excavator equipment. The trench would be lined with bed material before being backfilled with excavated material. In soft and waterlogged ground, the excavations may be shored with sheet piling. The pipe will be ballasted where necessary to prevent buoyancy. Any watercourses interrupted during excavation would be temporarily culverted, diverted or serviced with pumps to bypass the excavated section.

1.3.9. Open Cut Crossings are expected to be used within the Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, Dee (N.Wales), and North Wales WFD surface water bodies.

Vegetation Clearance

1.3.10. Riparian vegetation clearance would be limited as far as practicable to the immediate areas of construction to permit the execution of works. Vegetation would be reinstated post-construction as far as practicable. Vegetation clearance is expected to occur within the Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, Dee (N.Wales), and North Wales WFD surface water bodies.

Temporary Watercourse Crossings

1.3.11. Temporary Watercourse Crossings will occur on watercourses not crossed by the pipeline, but where construction vehicles must cross in order to provide access to working areas. These crossing are expected at Ince Marshes, Gowy, Stanney Mill Brook, Finchetts Gutter, Garden City Drain, Wepre Brook, and Hawarden Brook WFD surface water bodies.

1.3.12. Temporary crossings would not be required on watercourses which are being crossed using trenchless methods. The access to these working areas would be gained via each side of the watercourse. Temporary crossings at open cut crossings will be within the working width and therefore assessed as part of open cut crossings.

1.3.13. These temporary crossings would comprise of a temporary pipe to culvert the watercourse with backfill material around the pipe.

Dewatering

1.3.14. Dewatering would take place during excavations in areas of shallow groundwater. Extracted water would be passed through weired tanks to remove suspended solids if necessary prior to discharge to nearby watercourses. Significant dewatering is expected adjacent to the River Gowy and the West Central Drain. These are in the Gowy and Ince Marshes WFD surface water bodies.

Temporary Construction Compounds

1.3.15. Temporary Construction Compounds to accommodate construction works are expected to be set out in the Mersey, Stanney Mill Brook, Wepre Brook, and Dee (N. Wales) WFD surface water bodies.

Hydrostatic Testing

1.3.16. Following installation of the Newbuild Carbon Dioxide Pipeline, pre-commissioning activities of the pipeline system would determine the structural integrity of the pipeline.

1.3.17. The pipeline will be cleaned and gauged to remove construction debris and check that the tested section is free of deformations or obstructions. Hydrostatic testing will then be undertaken. This involves filling the pipeline in sections with water which is then pressurised to test the line for leaks.

1.3.18. The source of the water will be from either a commercial standpipe, water tanker, new water abstraction or, where practicable, water re-used from previously tested sections to reduce the total water use.

1.3.19. The total expected volume of water required for hydrostatic testing the entire length of the Stanlow AGI to Flint AGI Pipeline section is approximately 23,000m3. This is approximately 720m3 of water per kilometre of pipeline.

1.3.20. Following hydrostatic testing, the water will be quality tested, then discharged to either a designated watercourse, public sewer via a temporary surface water pipe or tankered away. The viability of each discharge option will be assessed at various locations along the pipeline route and relevant discharge licences obtained.

1.3.21. The pipeline will then be dried by using super dry air, nitrogen or by vacuum drying. The pipeline will then be pressured by super dry air or nitrogen and maintained at this pressure until commissioning.

1.3.22. For the three BVSs that will be installed along the Flint Connection to PoA Terminal Pipeline, only the sections of pipe which connect them to the existing pipeline would require to be tested, via the same method.

Construction Environmental Management Plan

1.3.23. An **Outline Construction Environmental Management Plan (OCEMP) (Document reference: D.6.5.4) and a Register of Environmental Actions and Commitments (REAC) (Document reference: D.6.5.1)** accompany this DCO Application and contain the mitigation relied on in the EIA to manage the environmental impacts of the DCO Proposed Development. The OCEMP includes best practise measures to adopt in the Construction Stage so that impact to the water environment is reduced. This will include best practise measures also within the Construction Compounds.

OPERATION STAGE

Culvert Replacement and Extension

1.3.24. It is proposed that an existing culvert on Elton Lane Ditch 1 would be replaced with a longer culvert. This is currently a culverted ditch to provide access to the field. The culvert requires lengthening for access vehicles to Ince AGI. This is located within the Ince Marshes WFD surface water body.

1.3.25. Installation of New Block Valves

1.3.26. The Block Valve Stations (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.

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

1.3.28. 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.

1.3.29. The BVSs are of a uniform size of approximately 45m x 40m and typically follow the same internal arrangement. A typical general arrangement plan of a BVS is provided in **Block Valve Stations Planning Arrangement (Document reference D.2.9).** The block valves will be installed below ground level to an anticipated minimum depth of approximately 1m, with only limited above ground visible elements.

1.3.30. 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).

1.3.31. Each BVS will comprise:

- Secure chain-link fencing up to 3m high incorporating a double access gate for vehicles;
- Security lighting only activated if required during a maintenance visit or in the event of an emergency; this includes perimeter lighting columns which would be up to 5m in height;

- Associated infrastructure (electrical transformer, control mechanisms, access arrangements, and an E&I Kiosk);
- Crushed aggregate ground finish, with an area paved to site the E&I kiosk and parking provision for up to two maintenance vehicles; and
- 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 3m wide. New power and fibre optic telecommunication connections to the existing utility network will be contained within / alongside each of the access tracks.

1.3.32. 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.

Installation of Above Ground Installations

1.3.33. The AGIs provide a transition point along the underground 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.

1.3.34. 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.

1.3.35. 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 transformer, 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;
- Security lighting activated only if required during a maintenance visit or in the event of an emergency, 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; and
- All equipment will be elevated on concrete foundations/plinths to mitigate flood risk, and no sensitive equipment will be located near ground level.

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

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

1.3.37. A total of four AGIs would be installed as part of the DCO Proposed Development. These are located at Ince, Stanlow, Northop Hall and Flint.

Drainage and Outfalls

1.3.38. The permanent above ground impermeable features at the BVS and AGI locations would be served by a formal drainage system. Further information on the proposed drainage strategy is provided in the **Surface Water Drainage Strategy Report (Document reference: D.6.5.13)**. In summary, surface water runoff would be collected via filter drains and piped to an attenuation basin. Surface water would then be discharged to a nearby watercourse at a restricted rate. The headwall of the outfalls would be to a new open channel which would connect to the nearby watercourse; therefore, no structures on watercourses are proposed for the drainage network.

1.3.39. There would be a vortex separator installed in each system to provide additional treatment of runoff. This would be implemented at all AGIs/BVSs, apart from Pentre Halkyn and Babell BVSs which would collect surface water and discharge to ground via infiltration, and at Stanlow AGI where the site would connect to the existing drainage system in the developed area.

DECOMMISSIONING ACTIVITIES

1.3.40. The DCO Proposed Development is permanent but it's 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 will be decommissioned safely, filled with nitrogen and left in-situ. The basis of assessment for operational life in the ES is 25 years.

1.3.41. Above ground features associated with AGIs and BVSs would be dismantled, cleared and the ground conditions restored to their previous condition. The method of removal is assumed to be equivalent to the construction method, but in reverse. However, a detailed methodology would be confirmed at the decommissioning stage.

During the decommissioning stage there will be a Decommissioning Environmental Management Plan (DEMP) adopted which would control potential impacts similar to those which may occur during the Construction Stage.

1.4. ENGAGEMENT

1.4.1. An engagement meeting between the Applicant and the Environment Agency's Geomorphology and Biodiversity Technical Specialists was held on 2 March 2022. Similarly, a consultation meeting between the Applicant and the Natural Resources Wales's Geomorphology and Biodiversity Technical Specialists was held on both 14 March, 25 May, and 19 July 2022. Minutes of these consultation meetings are provided in **Annex A**.

1.4.2. An initial consultation meeting between the Applicant and Biodiversity Technical Specialists from Natural Resources Wales and Natural England was held on 3 February 2021, where survey approaches and methodologies for surveying aquatic receptors was presented for discussion and comment. Following this, another consultation meeting was held on 19 November 2021 between the Applicant and Biodiversity Technical Specialists/representatives from Natural Resources Wales, Natural England and Flintshire County Council to discuss the approach to survey and assessment of aquatic receptors associated with the River Dee. Here, two potential options were presented; 'Do Nothing Approach', using desk-study information alone, and a 'Survey Approach' utilising appropriate surveys and methods. Potential mitigation measures were also tabled. A number of concerns were raised including: the presence of otter along the River Dee; timing of drilling in regard to fish movement; appropriate licences for survey work such as sediment grabs; potential maintenance requirements; impacts associated with blowouts/frac outs from HDD; and decommissioning. Following the meeting, Natural Resources Wales provided their written opinion, recommending the 'Survey Approach' be taken forward.

1.4.3. Email correspondence between the Applicant and Natural Resources Wales, and between the Applicant and the Environment Agency was undertaken on 6 April 2022 and 8 April 2022, respectively. This was to ensure specific concerns for key aquatic receptors and potential invasive non-native species (INNS) for watercourse crossings were addressed and agreed such that suitable avoidance and mitigation methods can be implemented to reduce risk of harm to a reasonable and acceptable level. A spreadsheet detailing watercourse crossings and the proposed crossing design/type were provided by the Applicant to both organisations. Natural Resources Wales' response provided key aquatic receptors for each watercourse crossing, and the potential for INNS at specific watercourses crossings. Environment Agency's response provided written comment outlining concerns for open trench crossings at specific watercourses citing potential adverse impacts to water vole and barriers to fish migration. Additionally, Environment Agency outlined the requirement for fish rescues for de-watering at open trench crossings, and the need for 2mm screening for over-pumping.

1.5. BACKGROUND TO THE WFD

1.5.1. An impact assessment of any works/modifications to water bodies in the UK is required under the European Union's Water Framework Directive (2000/60/EC) (**Ref. 1.1**). The WFD is transposed into law in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the 2017 Regulations) (SI 2017/407) (**Ref. 1.2**). For groundwater, the WFD is transposed into the policy paper The Groundwater (Water Framework Directive) (England) Direction 2016 (**Ref. 1.3**). For DCO applications, the WFDa process also needs to follow the Planning Inspectorate Guidance Note 18: The Water Framework Directive (**Ref. 1.4**). Compliance with the WFD legislation is required for permitting of the DCO Proposed Development.

1.5.2. The WFDa should also comply with relevant CEN/ISO Standards (**Ref. 2.15 to Ref. 2.21**), as stated within Annex V of the WFD legislation. Relevant standards are listed within **Section 2 (Methodology).**

1.5.3. The primary aim of the WFD is to improve/maintain the Ecological Status/Potential of all water bodies and to prevent deterioration in status of the water bodies and their associated WFD quality elements. Ecological Status/Potential is determined by a suite of biological, physico-chemical and hydromorphological quality elements. This WFDa aims to establish the baseline conditions, evaluate potential impacts of the DCO Proposed Development and assess compliance against WFD objectives.

1.5.4. The overarching objective of the WFD is for surface water bodies in Europe to attain overall ‘Good Ecological Status’ (GES) or ‘Good Ecological Potential’ (GEP). GES refers to situations where the ecological characteristics show only a slight deviation from natural/near natural conditions. In such a situation, the biological, chemical, physico-chemical and hydromorphological conditions are associated with limited or no human pressure. Artificial and heavily modified water bodies have a target to achieve GEP, which recognises their important uses, whilst ensuring the quality elements are protected as far as possible.

1.5.5. The WFD sets several objectives including:

- Prevent deterioration in status for water bodies;
- Aim to achieve good biological and good surface water chemical status in water bodies. For those water bodies that did not achieve GES by 2015, alternative objectives have been set by the Environment Agency and Natural Resources Wales where water bodies have been allocated a target date for compliance of either 2021 or 2027. The target date set for each water body takes into consideration measures that are practicably achievable for achieving GES or GEP;
- For water bodies that are designated as artificial or heavily modified, the objective is to achieve GEP. Those artificial/heavily modified water bodies that did not achieve GEP by 2015 need to achieve compliance by 2021 or 2027;
- Where is it considered either technically infeasible or disproportionately expensive to achieve GES or GEP by 2021 or 2027, alternative objectives have been set for the water body, such as a target to achieve Moderate status;
- Comply with objectives and standards for protected areas, where relevant; and,
- Reduce pollution from priority substances and cease discharges, emissions and losses of priority hazardous substances.

1.5.6. Where a new modification, change in activity or change to a structure on a water body is proposed, a WFDa needs to consider whether the proposed alteration would cause deterioration in the Ecological Status or Potential of any water body. For heavily modified/artificial water bodies, proposed new modifications, or changes to activities or structures, may also result in WFD mitigation measures or actions, set to help a water body achieve GES/GEP, being ineffective. This could result in the water body failing to meet GES/GEP. Where a WFDa concludes that deterioration or failure to achieve GES/GEP may occur, an Article 4.7 assessment would be required, which makes provision for deterioration of status provided that certain stringent conditions are met.

2. METHODOLOGY

2.1. DATA COLLECTION

DESK STUDY

2.1.1. A desk-based study was carried out to inform the WFDa, reviewing the existing information for the DCO Proposed Development and Study Area to develop a baseline for the catchments, watercourses, and surrounding areas. The following data sources were used for the desk study:

- Contemporary OS maps;
- Geology and soil maps (**Ref. 2.1**);
- Current aerial photography;
- WFD status and objectives from Catchment Data Explorer (**Ref. 2.2**);
- WFD status and objectives from Water Watch Wales (**Ref. 2.3**);
- Environment Agency Environment Agency's Ecology and Fish Data Explorer (**Ref. 2.4**);
- Environment Agency Water Quality Archive (Ref. 2.5);
- Historical maps (**Ref. 2.6**);
- Nature on the Map for designated areas, habitats and species, and landscape data **(Ref. 2.7**);
- Hydrological data **(Ref. 2.8**); and,
- WFD status and objectives from the 2015 Western Wales (**Ref. 2.9**), Dee **(Ref. 2.10**), and North West RDB (**Ref. 2.11**) River Basin Management Plans for cycle 2 data.

2.2. FIELD SURVEY

HYDROMORPHOLOGY SURVEYS

2.2.1. Hydromorphology surveys were conducted, and data analysed in compliance with the CEN standards for hydromorphology (**Ref. 2.12 and Ref. 2.13)**.

2.2.2. Hydromorphology walkover surveys were carried out on 13 and 14 October 2021 and 2 and 3 November 2021. The purpose of these surveys was to characterise the baseline hydromorphological conditions of watercourses potentially impacted by the DCO Proposed Development.

2.2.3. A hydrogeological walkover surveys was carried out in March 2022. The aim of the walkover survey was to locate abandoned mine entries shown on

The Coal Authority's Interactive Map Viewer which were considered to represent a potential mine water risk.

2.2.4. Data collected from these walkover surveys was used not only to inform this WFDa but also to inform the design development process. The data aided the elimination of potential impacts through design and the reduction of potential impacts where practicable. For example, where practicable, proposed open cut crossings were changed to trenchless crossings due to hydromorphological sensitivity observed on site.

2.2.5. The data collected was therefore used to comply with the eliminate, reduce, manage and enhance stepwise approach to WFD and biodiversity assessment.

RIVER CONDITION ASSESSMENT

2.2.6. River Condition Assessment (RCA) was conducted by accredited professionals using the standard RCA field methodology (MoRPh5) (**Ref. 2.14**). MoRPh5 surveys were undertaken on watercourses within the Newbuild Infrastructure Boundary and within 10m, with Ditch habitat surveys undertaken as appropriate. Surveys were undertaken during April and May 2022.

2.2.7. Additional MoRPH5 surveys were undertaken on 16 and 17 June 2022 due to the inclusion of outfalls as part of the drainage strategy.

2.2.8. Due to landowner land access restrictions at the time of surveys, Hawarden Brook has not been surveyed. This watercourse is within the Newbuild Infrastructure Boundary but is not crossed by the Newbuild Carbon Dioxide Pipeline. However, a temporary culvert may be required on this watercourse during the Construction Stage.

2.2.9. The results of the MoRPh5 surveys were used to generate a river condition value, which was used within the rivers component of the Biodiversity Metric 3.1 (hereafter referred to as the Rivers BNG metric). The potential loss of River BNG units was then estimated based on the potential for permanent loss of river units arising due to the DCO Proposed Development.

2.2.10. Whilst the Rivers BNG metric is used in England, the BNG strategy for the DCO Proposed Development is to employ the same methodology for assessing BNG Rivers for both England and Wales. In line with the Welsh Government Biodiversity Strategy, a step-wise approach to biodiversity assessment for rivers and streams has been adopted (eliminate, reduce, manage, enhance). The Rivers BNG metric then provides a measurable impact to biodiversity.

2.2.11. The Rivers BNG metric methodology and the full suite of results is presented in **Biodiversity Net Gain Report (Document reference: D.6.5.12)**.

AQUATIC ECOLOGY SURVEYS

2.2.12. The aquatic ecology surveys, sampling and analysis are undertaken in accordance with the following CEN standards, as required by Annex V of the WFD legislation:

- CEN EN ISO 8689-2000 Water Quality - Biological classification of rivers - Part 1: Guidance on the interpretation of biological quality data from surveys of benthic macroinvertebrates (**Ref. 2.15**).
- CEN EN ISO 8689-2:2000 Water Quality - Biological classification of rivers - Part 2: Guidance on the presentation of biological quality data from surveys of benthic macroinvertebrates (**Ref. 2.16**).
- CEN EN 17136:2019 Water Quality – Guidance on field and laboratory procedures for quantitative analysis and identification of macroinvertebrates from inland surface waters (**Ref. 2.17**).
- CEN EN ISO 10870:2012 Water quality - Guidelines for the selection of sampling methods and devices for benthic macroinvertebrates in fresh waters (**Ref. 2.18**).
- CEN EN 14184:2014 Water quality - Guidance for the surveying of aquatic macrophytes in running waters (**Ref. 2.19**).
- CEN EN 14962:2006 Water quality - Guidance on the scope and selection of fish sampling methods (**Ref. 2.20**).
- CEN EN 14011:2003 Water Quality – Sampling of fish with electricity (**Ref. 2.21**).

Aquatic Habitat Walkover Surveys

2.2.13. Aquatic habitat walkover assessments were conducted along all watercourses to be crossed by the DCO Proposed Development between April 2021 and April 2022. Assessments were conducted to scope the potential of aquatic habitat and species receptors up to 100m up and downstream of the proposed crossing points, where possible, and to inform the need for further aquatic ecology surveys.

2.2.14. The potential for each watercourse to support legally protected and/or notable aquatic species was assessed through field observations of various channel and bank characteristics.

Fish Surveys

Electric Fishing

2.2.15. A total of 17 watercourses were identified to provide suitable fish habitat during the aquatic habitat walkover surveys, and therefore scoped in for fish population assessment.

2.2.16. The fish population of each watercourse was intended to be assessed using quantitative electric fishing survey methods. However, due to health and safety risks and access limitations, electric fishing could only be safely and/or practicably conducted on one watercourse, Backford Brook. The survey was carried by a team of suitably qualified and experienced aquatic ecologists on 21 September 2021.

2.2.17. Electric fishing is the term applied to a process that establishes an electric field in the water in order to capture fish. When exposed to the field, most fish become oriented toward the anode and as the density of the electric field increases, they swim toward it. In close proximity to the anode, they are immobilised.

2.2.18. Electric fishing followed a standard electric fishing method and technique following guidelines developed by the Environment Agency (**Ref. 2.22; Ref. 2.23; Ref. 2.24**) which conform to British Standard BS EN 14011:2003 Water Quality – Sampling of Fish with Electricity (Ref. 2.25) and was carried out with Environment Agency authorisation.

2.2.19. Once electric fishing had ceased, a fish habitat survey was carried out. This survey included an assessment of water depth; channel, bank and bed widths; flow, substrate composition; and bank characteristics of the watercourse. The vegetation types present, along with percentage canopy cover and percentage fish cover, were also recorded.

<u>Environmental-DNA (e-DNA)</u>

2.2.20. As electric fishing surveys could not be safely conducted on the remaining watercourses, assessment of fish species present was determined through the collection and analysis of environmental-DNA (e-DNA). e-DNA is deoxyribonucleic acid (DNA) that is collected from the environment in which an organism lives, rather than directly from the plants or animals themselves.

2.2.21. e-DNA samples were collected from 17 watercourses between 16 February 2022 and 01 June 2022. This included Backford Beck, as it was determined that potential poor efficacy of the electric fishing survey caused by woody debris and silt deposits may have resulted in an unrepresentative fish community baseline condition. All e-DNA samples were taken by suitably trained staff in order to minimise the possibility of cross contamination and ensure that representative samples were collected. Samples were collected using NatureMetrics' standard operating procedure, which is consistent with the current draft of the BS EN/ISO Water sampling for capture of macrobial environmental DNA in aquatic environments guidance (**Ref. 2.26**).

Aquatic macroinvertebrate sampling

2.2.22. Aquatic macroinvertebrate surveys were undertaken at 17 watercourses by suitably qualified and experienced aquatic ecologists. Sampling was undertaken in either Spring 2021, Autumn 2021, and Spring 2022; all 17 watercourses were sampled in spring, with 12 also sampled in autumn.

2.2.23. Samples were collected using either standard three-minute kick sampling or standard three-minute sweep sampling of all in-channel habitats in proportion to their occurrence, using a standard sampling net (1mm mesh), with a one-minute timed hand search following the Environment Agency procedure (**Ref. 2.27**). This methodology conforms to the CEN/ISO Water quality guidance for the selection of sampling methods and devices for benthic macroinvertebrates in fresh waters (**Ref. 2.28**).

2.2.24. A standardised field sheet was completed to include details of channel and bank physical habitat (material of banks and substrates, flow types, physical processes, bank structure), riparian land use and potential sources of anthropogenic stress.

2.2.25. Samples were placed in one-litre sample pots, preserved in Industrial Denatured Alcohol (IDA) on site and transported to the laboratory for sorting and identification to Taxonomic Level 5, in adherence with Environment Agency procedures (**Ref. 2.29**).

2.2.26. Analysis of aquatic macroinvertebrate biological metrics allowed the assignation of ecological values to the aquatic macroinvertebrate communities recorded and an assessment of pressures on those communities to be made. The context and applicability of each metric is detailed in the **Appendix 9.9 - Aquatic Ecology (Volume III).**

Macrophyte survey

2.2.27. A total of five watercourses were identified to provide suitable macrophyte and phytoplankton habitat during the aquatic habitat walkover surveys, and therefore scoped in for macrophyte surveys. Macrophyte surveys were conducted at three of these watercourses in May 2022; Rake Lane Brook and Broughton Brook could not be surveyed due to access limitations and safety concerns.

2.2.28. Surveys were conducted by suitably qualified and experienced aquatic ecologists using the Water Framework Directive UK Technical Advisory Group's methodology for assessing macrophytes in rivers (WFDUKTAG) (**Ref. 2.30**). This method conforms with CEN 14184: 2014 Water Quality –

Guidance standard for the surveying of aquatic macrophytes in running waters. The method is detailed further in the **Appendix .9-9 - Aquatic Ecology (Volume III)**.

ENVIRONMENT AGENCY RECORDS

2.2.29. Fish, aquatic macroinvertebrate and macrophyte survey data for the River Gowy were obtained from the Environment Agency's Ecology and Fish Data Explorer website (**Ref. 2.4**).

2.2.30. Water quality data was downloaded from the Environment Agency Water Quality Archive (**Ref. 2.5**).

NATURAL RESOURCES WALES RECORDS

2.2.31. Natural Resource Wales (NRW) provided key aquatic receptors, as well as the potential for INNS, for the following watercourses:

- Sealand Main Drain;
- Railway ditches;
- Broughton Brook;
- Chester Road Drain Tributary 1;
- New Inn Brook;
- Alltami Brook;
- Wepre Brook;
- Willow Park Brook;
- Northop Brook; and
- Little Lead Brook.

2.3. WFD ASSESSMENT PROCESS

2.3.1. The assessment methodology used here is based on guidance provided by the Planning Inspectorate Advice Note 18: The Water Framework Directive (Ref. 2.31). This guidance outlines a three-stage process to WFDa: screening, scoping, and impact assessment.

STAGE 1: SCREENING

2.3.2. Screening is required to identify activities which have the potential to result in deterioration of a water body or fail to comply with the objectives of that water body. Screening also serves to identify those proposed activities (e.g., proposed construction methods) that are required to be taken through to scoping, and those activities that are unlikely to result in the deterioration of the water body.

STAGE 2: SCOPING

2.3.3. Scoping is required to identify risks to receptors from a project's activities, based on the relevant water bodies and their water quality elements (including information on status, objectives, and the parameters for each water body). Potential risks to hydromorphology, biology (habitats, fish, invertebrates, macrophytes and phytoplankton), water quality, WFD protected areas and invasive non-native species should be assessed. The scoping stage identifies which elements need to be carried forward to Stage 3.

STAGE 3: IMPACT ASSESSMENT

2.3.4. Where assessment has been considered necessary at scoping stage, an impact assessment is carried out for each receptor identified as being at risk in terms of potential deterioration or non-compliance with its specific objectives as set out in the River Basin Management Plan as a result of the DCO Proposed Development. Where the potential for deterioration of water bodies is identified, and it is not possible to mitigate the impacts to a level where deterioration can be avoided, the DCO Proposed Development would need to be assessed in the context of Article 4(7) of the WFD.

2.3.5. Whilst the assessment of potential construction impacts is not required as part of a WFDa, these impacts may have detrimental impacts on the WFD quality elements and construction periods may sometimes be of long duration (i.e., several years). Thus, construction impacts are considered, along with mitigation to reduce or eliminate potential impacts on the water body and WFD quality elements.

COASTAL AND TRANSITIONAL WFD WATER BODIES

2.3.6. For coastal and transitional WFD water bodies, the Environment Agency guidance for assessing estuarine and coastal waters was followed (**Ref. 2.32**).

2.4. LIMITATIONS AND ASSUMPTIONS

2.4.1. The RCA covers at least 20% of the watercourses' length within the Newbuild Infrastructure Boundary, as stated in the stablished methodology (**Ref. 2.14**). Therefore, a significant part of the watercourses is not covered directly by the RCA, whilst the surveyed sections are assumed to be representative of the overall watercourses within the Newbuild Infrastructure Boundary.

2.4.2. The ground investigation performed to inform the Preliminary Design included limited spatial coverage of groundwater monitoring points. across the DCO Proposed Development. BGS historic borehole records were used to supplement the GI data however this historic data may not be representative of current conditions.

2.4.3. Access to Hawarden Brook or Canal Ditch was not possible and therefore no site-specific baseline data is available for these watercourses.

2.4.4. Access to Elton South Ditch was not possible due to terrestrial vegetation and scrub making access unsafe. Therefore, aquatic ecology surveys could not be undertaken at Elton Lane South Ditch. Consequently, the biological elements have been scoped out for this watercourse

2.4.5. Channel profiles, steep banks and bankside vegetation cover constrained access to many watercourses such that a complete and comprehensive survey to inform the fish community baseline was not possible. The efficiencies of traditional quantitative fish survey methods, such as electric fishing, were unlikely to be representative of the actual fish community for most watercourses. Netting techniques would have similarly been constrained through the physical dimensions and character of these watercourses. Moreover, several watercourses posed clear health and safety risks for wading-based electric fishing surveys. In order to gain a better understanding of the fish populations of these watercourses, water samples were taken for those sites identified as having suitable fish habitat and analysed for fish DNA against an extensive reference library.

2.4.6. Channel profiles, steep banks and bankside vegetation cover, constrained access to Chester Road Drain North such that a Fish e-DNA sample could not be collected. Therefore, a complete and comprehensive assessment to inform the ecological baseline was not possible. However this is not considered to impact the overall assessment, as fish habitat within the drain was considered to be poor, based upon site observations.

2.4.7. Rake Lane Brook could not be safely accessed to undertake a macrophyte survey. Therefore, a complete and comprehensive assessment to inform the ecological baseline was not possible. However this is not considered to impact the overall assessment, as low macrophyte species diversity was observed on initial scoping surveys. In addition to low species diversity, evidence of heavy bank poaching by livestock was observed on this visit.

2.4.8. Three invertebrate samples were taken outside of the traditional sampling seasons. Surveys were conducted in early June only two weeks outside of the sampling season. Such surveys were to confirm the presence and/or likely absence of species of conservation interest, and as such, the results of these surveys are likely to remain valid.

2.4.9. The invertebrate sampling methods used were selected to provide the data necessary for the calculation of a range of biological quality indices. It was not intended that the sampling methods would capture a full list of all species present within the water body, which would vary according to season and abundance of individual species. Identification to species level was not always possible where juvenile or damaged specimens were present in the sample or were not identified to species level as standard. Nevertheless, through the calculation of appropriate indices, it was possible to evaluate the biological quality of the water body in relation to others.

2.4.10. Macrophyte surveys were conducted outside of the optimum survey window. As such, the results of these surveys are likely to be limited by restricted macrophyte growth and the absence of flowers used in identification. However, macrophyte surveys were conducted as a precautionary measure, with no optimum habitat being identified during the aquatic habitat walkover surveys or consequent macrophyte surveys. Therefore, it is unlikely that the assessed ecological baseline would differ if surveys were conducted in the appropriate season.

3. WFD SCRRENING AND SCOPING

3.1. STAGE 1: WFD SCREENING

3.1.1. The purpose of the WFD screening stage is to identify the extent to which the DCO Proposed Development may affect WFD water bodies that lie within the zone of influence of the DCO Proposed Development.

SCREENING OF WATER BODIES

3.1.2. The screening of the WFD water bodies potentially affected by the DCO Proposed Development is presented in **Table 3.1**. This includes rivers, artificial, transitional and groundwater bodies. Activities relating to the construction and operation of the DCO Proposed Development have been assessed in terms of their potential impact on those water bodies.

Table 3.1: Screening of WFD water bodies within the Newbuild Infrastructure Boundary

WFD Water body (ID)	Type	Screened in or out?	Justification
Peckmill Brook, Hoolpool Gutter and Ince Marshes) (referred to as Ince Marshes in the report) (GB112068060330)	River	In	Watercourses within this water body would be crossed by the Newbuild Carbon Dioxide Pipeline. Also, Ince AGI is also proposed within this water body.
Mersey (GB531206908100)	Transitional	In	This water body is not crossed by the Newbuild Carbon Dioxide Pipeline. However, it is located downstream of a water body crossed by the Newbuild Carbon Dioxide Pipeline (Gowy, Milton Brook to Mersey).
Gowy (Milton Brook to Mersey) (GB112068060250)	River (HMWB)	In	This water body would be crossed by the Newbuild Carbon Dioxide Pipeline. An

WFD Water body (ID)	Type	Screened in or out?	Justification
			upstream water body (Stanney Mill Brook) would also be crossed by the Newbuild Carbon Dioxide Pipeline.
Stanney Mill Brook (GB112068060260)	River (HMWB)	In	This water body would be crossed by the Newbuild Carbon Dioxide Pipeline.
Shropshire Union Canal (referred to as SUC in the report) (GB71210133)	Artificial	In	The canal would be crossed by the Newbuild Carbon Dioxide Pipeline using a trenchless method
Manchester Ship Canal (GB71210004)	Artificial	In	Ince Marshes are pumped into Manchester Ship Canal therefore any potential impact to Ince Marshes could impact the canal.
Finchetts Gutter (GB111067056930)	River (HMWB)	In	This watercourse and its tributaries would be crossed by the Newbuild Carbon Dioxide Pipeline with trenched crossings.
Garden City Drain (GB111067056960)	River (HMWB)	In	Tributaries of this watercourse would be crossed by the Newbuild Carbon Dioxide Pipeline by trenched crossings.
Sandycroft Drain (GB111067052160)	River	In	This water body would be crossed by the Newbuild Carbon Dioxide Pipeline in several locations.
Wepre Brook (GB111067056880)	River	In	This water body would be crossed by

WFD Water body (ID)	Type	Screened in or out?	Justification
			the Newbuild Carbon Dioxide Pipeline via open cut (trenched) methods and has drainage, attenuation ponds and outfalls.
Swinchiard Brook (GB111067056940)	River	In	The Nant-y-Fflint has a new outfall and receives surface water from Cornist Lane BVS.
Dee (N. Wales) (GB531106708200)	Transitional	In	The Dee would be crossed by the Newbuild Carbon Dioxide Pipeline. The Dee WFD water body is also downstream of several watercourses (within both England and Wales) which are crossed by the Newbuild Carbon Dioxide Pipeline.
North Wales (GB641011650000)	Coastal	Out	No works are proposed within or immediately upstream of this coastal water body.
Wheeler – Lower (GB110066059930)	River	In	Babell BVS is proposed within this water body.
Pant-Gwyn (GB110066059940)	River	In	Pentre Halkyn BVS is proposed within this water body.
Wirral and West Cheshire Permo-Triassic Sandstone Aquifers (GB41101G202600)	Groundwater	In	The Newbuild Carbon Dioxide Pipeline passes through this groundwater body.
Dee Permo-Triassic Sandstone (GB41101G202400)	Groundwater	In	The Newbuild Carbon Dioxide Pipeline

WFD Water body (ID)	Type	Screened in or out?	Justification
			passes through this groundwater body.
Dee Carboniferous Coal Measures (GB41102G204800)	Groundwater	In	The Newbuild Carbon Dioxide Pipeline passes through this groundwater body.
Clwyd Carboniferous Limestone (GB41001G200300)	Groundwater	In	Pentre Halkyn and Babell BVSs are located within this groundwater body

SCREENING OF ACTIVITIES

3.1.3. The DCO Proposed Development comprises construction, operation and decommissioning activities described in **Section 1.3**. The screening process of these activities is presented in **Table 3.2**

3.1.4. Those activities screened in for further assessment in **Table 3.2** are carried forward to Stage 2: Scoping. Those activities screened out of further assessment are not considered further.

Table 3.2: Screening of activities

Activity	Screened in or out?	Justification
Construction Stage		
Trenchless crossings	In	Excavation of pits could create vibration that impacts fish populations, and potential chemical and artificial light pollution that could impact the biological quality of the watercourses. On the River Gowy, the Newbuild Carbon Dioxide Pipeline could affect river continuity and river depth and width variation in the future due to plans to set-back the flood embankments to allow re-naturalisation of the channel.

Activity	Screened in or out?	Justification
		Therefore, these two hydromorphology quality elements are scoped in for the River Gowy only. The following water bodies are assessed for this activity: Ince Marshes; Gowy; Stanney Mill Brook; SUC; Finchetts Gutter; Sandycroft Drain; and Dee (N.Wales).
Open cut crossings	In	Disruption of watercourse through temporary excavation could impact the hydromorphological, biological and chemical quality of watercourses and their downstream receptors. The following water bodies are assessed for this activity: Mersey; Ince Marshes; Gowy; Stanney Mill Brook; Manchester Ship Canal; Finchetts Gutter; Garden City Drain; Sandycroft Drain; Wepre Brook; and Dee (N.Wales).
Vegetation clearance	In	Removal of vegetation can increase susceptibility of bed and bank erosion. This has potential to impact the hydromorphological and biological quality of watercourses and downstream receptors. The following water bodies are assessed for this activity: Mersey; Ince Marshes; Gowy; Stanney Mill Brook; Finchetts Gutter; Garden City Drain; Sandycroft Drain; Wepre Brook; and Dee (N.Wales).
Temporary watercourse crossings	In	Disruption of watercourse through temporary culverts could impact the hydromorphological, biological and chemical quality of watercourses and their downstream receptors. The following water bodies are assessed for this activity:

Activity	Screened in or out?	Justification
		Ince Marshes; Gowy; Stanney Mill Brook; Finchetts Gutter; Garden City Drain; Wepre Brook; and Dee (N. Wales)
Dewatering	In	Temporary increased flows within receiving watercourse could affect the physico-chemical and hydromorphological quality of watercourses. This activity is screened out for groundwater given that impacts would be temporary in nature only, with no long-term impacts on the WFD groundwater body. However, all surface water WFD water bodies could be impacted by this activity (Ince Marshes; Mersey; Gowy; Stanney Mill Brook; Manchester Ship Canal; Finchetts Gutter; Garden City Drain; Sandycroft Drain; Wepre Brook; and Dee (N.Wales)).
Temporary Construction Compounds	Out	The potential impacts associated with Temporary Construction Compounds would be controlled via the measures adopted in the **OCEMP (Document reference: D.6.5.4)**. The measures would be implemented to control runoff, pollutants and material stored within the Construction Compounds so that there is no adverse impact to nearby watercourses.
Hydrostatic Testing	In	Testing the newly installed Newbuild Carbon Dioxide Pipeline could produce water leaking and ultimately impact the floodplain and in-channel dynamics. All surface water WFD water bodies could be potentially impacted by this activity (Ince Marshes; Mersey;

Activity	Screened in or out?	Justification
		Gowy; Stanney Mill Brook; Manchester Ship Canal; Finchetts Gutter; Garden City Drain; Sandycroft Drain; SUC; Wepre Brook; and Dee (N.Wales)).
Operation Stage		
Culvert replacement and extension	In	Increased culvert length could impact hydromorphological, biological and physico-chemical quality of the watercourse. This activity has the potential to impact Ince Marshes water body.
Operation of BVSs	Out	The BVSs are located more than 10m away from watercourses and so would not affect the riparian zone. The drainage of the BVSs is considered separately below. No long-term impact on groundwater classification from excavation for BVSs. Therefore, the Wheeler-Lower and Pant Gwyn water bodies are not considered further in this assessment.
Operation of AGIs	In	Ince AGI is located within 10m of East Central Drain and therefore has potential to impact the riparian zone of this watercourse. The drainage of the AGIs is considered separately below. This activity is screened in for Ince Marshes water body only as all other AGIs are located at least 10m away from watercourses and their drainage is assessed separately..
Drainage, attenuation ponds and outfalls	In	Attenuation ponds are proposed as part of the drainage strategy. These would include treatment trains and new outfalls to watercourses. The new surface water outfalls and associated discharge could affect hydromorphological, chemical and

Activity	Screened in or out?	Justification
		biological quality of receiving watercourses. The following water bodies are assessed for this activity: Ince Marshes; Mersey; Manchester Ship Canal; Finchetts Gutter; Dee (N. Wales); Swinchiard Brook; and Wepre Brook. With the surface water drainage strategy implemented there would be no significant impact on groundwater classifications. The attenuation ponds are not considered further given that they would not directly interact with WFD quality elements.
Decommissioning activities	Out	Potential impact from temporary works are expected to be managed by the implementation of measures within the DEMP.

3.2. STAGE 2: WFD SCOPING

3.2.1. The WFD scoping stage defines the level of detail required for further WFD assessment. This includes identifying risks to the WFD receptors from the DCO Proposed Development’s activities. The scoping of WFD quality elements for Construction Stage activities is presented in **Table 3.3** for all surface, transitional, and coastal WFD water bodies. The scoping of WFD scoping of quality elements for the Operational Stage is presented in **Table 3.4** for all surface, transitional, and coastal WFD water bodies.

3.2.2. The groundwater scoping stage assessment is presented in **Table 3.5** and **Table 3.6** for the Wirral and West Cheshire Permo-Triassic Sandstone Aquifers (GB41101G202600), Dee Permo-Triassic Sandstone (GB41101G202400), Dee Carboniferous Coal Measures (GB41102G204800) and Clwyd Carboniferous Limestone (GB41001G200300) groundwater WFD water bodies.

Table 3.3: Scoping of surface, transitional, and coastal WFD quality elements for Construction Stage activities

WFD Quality Element	Activities					
	Trenchless crossings	**Open Cut Crossing**	**Riparian Vegetation clearance**	**Temporary watercourse crossing**	**Dewatering**	**Hydrostatic testing**
	Water bodies					
	Ince Marshes, Gowy, Stanney Mill Brook, SUC, Finchetts Gutter, Sandycroft Drain, Dee (N.Wales)	*Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, Dee(N.Wales)*	*Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, Dee(N.Wales)*	*Ince Marshes, Gowy, Stanney Mill Brook, Finchetts Gutter, Garden City Drain, Wepre Brook, Dee (N. Wales)*	*Ince Marshes, Mersey, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, Dee (N.Wales)*	*Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, SUC, Wepre Brook, Dee(N.Wales)*
Surface water / Transitional / Coastal						
Biological						
Fish	In – Trenchless crossings can potentially impact this element.	In – Open Cut Crossing can potentially impact this element within the Ince Marshes, Gowy, Finchetts Gutter, Garden city Drain and Wepre Brook water bodies only.	In – Riparian vegetation clearance can potentially impact this element.	In – Temporary watercourse crossings can potentially impact this element.	Out - Dewatering is not expected to cause alterations to this element.	In – Hydrostatic testing can potentially cause alterations to this element.
Invertebrates	In – Trenchless crossings can potentially impact this element within the Gowy, Stanney Mill Brook, Sandycroft Drain and Dee (N.Wales) water bodies only.	In – Open Cut Crossing can potentially impact this element within the Mersey, Ince Marshes, Gowy, Finchetts Gutter, Garden City Drain, Sandycroft Drain and Wepre Brook water bodies only.	In – Riparian vegetation clearance can potentially impact this element.	In – Temporary watercourse crossings can potentially impact this element.	Out - Dewatering is not expected to cause alterations to this element.	In – Hydrostatic testing can potentially cause alterations to this element.
Macrophytes & Phytoplankton	In – Trenchless crossings can potentially impact this element within the Gowy and SUC water bodies only.	In – Open Cut Crossing can potentially impact this element within the Gowy and Finchetts Gutter water bodies only.	In – Riparian vegetation clearance can potentially impact this element within the Ince Marshes, Gowy, Finchetts Gutter and Dee (N.Wales water bodies only.	In – Temporary watercourse crossings can potentially impact this element.	Out - Dewatering is not expected to cause alterations to this element.	In – Hydrostatic testing can potentially cause alterations to this element.

WFD Quality Element	Activities					
	Trenchless crossings	Open Cut Crossing	Riparian Vegetation clearance	Temporary watercourse crossing	Dewatering	Hydrostatic testing
	Water bodies					
	Ince Marshes, Gowy, Stanney Mill Brook, SUC, Finchetts Gutter, Sandycroft Drain, Dee (N.Wales)	*Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, Dee(N.Wales)*	*Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, Dee(N.Wales)*	*Ince Marshes, Gowy, Stanney Mill Brook, Finchetts Gutter, Garden City Drain, Wepre Brook, Dee (N. Wales)*	*Ince Marshes, Mersey, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, Dee (N.Wales)*	*Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, SUC, Wepre Brook, Dee(N.Wales)*
Surface water						
Physico-Chemical						
Thermal Conditions	Out – Trenchless crossings are not expected to cause alterations to this element.	In – Open Cut Crossing can potentially impact this element.	In – Riparian vegetation clearance can potentially alter this element.	In – Temporary watercourse crossing can potentially alter this element.	In – Dewatering can potentially alter this element.	In – Hydrostatic testing can potentially cause alterations to this element.
Oxygenation Conditions	In – Trenchless crossings can potentially impact this element.	In – Open Cut Crossing can potentially impact this element.	In – Riparian vegetation clearance can potentially alter this element.	In – Temporary watercourse crossing can potentially alter this element.	In – Dewatering can potentially alter this element.	In – Hydrostatic testing can potentially cause alterations to this element.
Salinity	Out – Trenchless crossings are not expected to cause alterations to this element.	Out – Open cut crossing is not expected to cause alterations to this element.	Out – Riparian vegetation clearance is not expected to cause alterations to this element.	Out – Temporary watercourse crossing is not expected to cause alterations to this element.	In – Dewatering can potentially alter this element.	In – Hydrostatic testing can potentially cause alterations to this element.
Acidification Status	Out – Trenchless crossings are not expected to cause alterations to this element.	Out – Open cut crossing is not expected to cause alterations to this element.	Out – Riparian vegetation clearance is not expected to cause alterations to this element.	Out – Temporary watercourse crossing is not expected to cause alterations to this element.	In – Dewatering can potentially alter this element.	In – Hydrostatic testing can potentially cause alterations to this element.
Nutrient Conditions	Out – Trenchless crossings are not expected to cause alterations to this element.	Out – Open cut crossing is not expected to cause alterations to this element.	In – Riparian vegetation clearance can potentially alter this element.	Out – Temporary watercourse crossing is not expected to cause alterations to this element.	In – Dewatering can potentially alter this element.	In – Hydrostatic testing can potentially cause alterations to this element.
Priority Hazardous Substances	In – Trenchless crossings can potentially impact this element.	In – Open Cut Crossing can potentially impact this element.	Out – Riparian vegetation clearance is not expected to cause alterations to this element.	In – Temporary watercourse crossing can potentially alter this element.	In – Dewatering can potentially alter this element.	In – Hydrostatic testing can potentially cause alterations to this element.

WFD Quality Element	Activities					
	Trenchless crossings	Open Cut Crossing	Riparian Vegetation clearance	Temporary watercourse crossing	Dewatering	Hydrostatic testing
	Water bodies					
	Ince Marshes, Gowy, Stanney Mill Brook, SUC, Finchetts Gutter, Sandycroft Drain, Dee (N.Wales)	*Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, Dee(N.Wales)*	*Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, Dee(N.Wales)*	*Ince Marshes, Gowy, Stanney Mill Brook, Finchetts Gutter, Garden City Drain, Wepre Brook, Dee (N. Wales)*	*Ince Marshes, Mersey, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, Dee (N.Wales)*	*Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, SUC, Wepre Brook, Dee(N.Wales)*
Hydromorphological						
Quantity and Dynamics of Flow	Out – Trenchless crossings are not expected to cause alterations to this element.	In – Open cut crossing can potentially alter this element.	In – Riparian vegetation clearance can potentially alter this element.	In – Temporary watercourse crossing can potentially alter this element.	In – Dewatering can potentially alter this element.	In – Hydrostatic testing can potentially cause alterations to this element.
Connection to Groundwater	Out – Trenchless crossings are not expected to cause alterations to this element.	Out – Open cut crossing is not expected to cause alterations to this element.	Out – Riparian vegetation clearance is not expected to cause alterations to this element.	Out – Temporary watercourse crossing is not expected to cause alterations to this element.	Out – Dewatering is not expected to cause alterations to this element.	Out – Hydrostatic testing is not expected to cause alterations to this element.
River Continuity	In – for the River Gowy crossing only Out – for all other water bodies where trenchless methods proposed – Trenchless crossings are not expected to cause alterations to this element.	In – Open cut crossing can potentially alter this element.	Out – Riparian vegetation clearance is not expected to cause alterations to this element.	In – Temporary watercourse crossing can potentially alter this element.	Out – Dewatering is not expected to cause alterations to this element.	Out – Hydrostatic testing is not expected to cause alterations to this element.
River Depth and Width Variation	In – for the River Gowy crossing only Out – for all other water bodies trenchless crossings are not expected to cause alterations to this element.	In – Open cut crossing can potentially alter this element.	Out – Riparian vegetation clearance is not expected to cause alterations to this element.	In – Temporary watercourse crossing can potentially alter this element.	In – Dewatering can potentially alter this element.	In – Hydrostatic testing can potentially cause alterations to this element.
Structure and Substrate of the River Bed	Out – Trenchless crossings are not expected to cause alterations to this element.	In – Open cut crossing can potentially alter this element.	In – Riparian vegetation clearance can potentially alter this element.	In – Temporary watercourse crossing can potentially alter this element.	In – Dewatering can potentially alter this element.	In – Hydrostatic testing can potentially cause alterations to this element.

WFD Quality Element	Activities					
	Trenchless crossings	Open Cut Crossing	Riparian Vegetation clearance	Temporary watercourse crossing	Dewatering	Hydrostatic testing
	Water bodies					
	Ince Marshes, Gowy, Stanney Mill Brook, SUC, Finchetts Gutter, Sandycroft Drain, Dee (N.Wales)	*Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, Dee(N.Wales)*	*Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, Dee(N.Wales)*	*Ince Marshes, Gowy, Stanney Mill Brook, Finchetts Gutter, Garden City Drain, Wepre Brook, Dee (N. Wales)*	*Ince Marshes, Mersey, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, Dee (N.Wales)*	*Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, SUC, Wepre Brook, Dee(N.Wales)*
Structure of the Riparian Zone	Out – Trenchless crossings are not expected to cause alterations to this element.	In – Open cut crossing can potentially alter this element.	In – Riparian vegetation clearance can potentially alter this element.	In – Temporary watercourse crossing can potentially alter this element.	Out – Dewatering is not expected to cause alterations to this element.	Out – Hydrostatic testing is not expected to cause alterations to this element.
Transitional / Coastal						
Physico-Chemical						
Transparency	Out – Trenchless crossings are not expected to cause alterations to this element.	In – Open cut crossing can potentially alter this element.	Out – Riparian vegetation clearance is not expected to cause alterations to this element.	Out – Temporary watercourse crossing is not expected to cause alterations to this element.	In – Dewatering can potentially alter this element.	In – Hydrostatic testing can potentially cause alterations to this element.
Thermal Conditions	Out – Trenchless crossings are not expected to cause alterations to this element.	In – Open cut crossing can potentially alter this element.	Out – Riparian vegetation clearance is not expected to cause alterations to this element.	Out – Temporary watercourse crossing is not expected to cause alterations to this element.	In – Dewatering can potentially alter this element.	In – Hydrostatic testing can potentially cause alterations to this element.
Oxygenation Conditions	Out – Trenchless crossings are not expected to cause alterations to this element.	Out – Open cut crossing is not expected to cause alterations to this element.	Out – Riparian vegetation clearance is not expected to cause alterations to this element.	Out – Temporary watercourse crossing is not expected to cause alterations to this element.	In – Dewatering can potentially alter this element.	In – Hydrostatic testing can potentially cause alterations to this element.
Nutrient Conditions	Out – Trenchless crossings are not expected to cause alterations to this element.	Out – Open cut crossing is not expected to cause alterations to this element.	Out – Riparian vegetation clearance is not expected to cause alterations to this element.	Out – Temporary watercourse crossing is not expected to cause alterations to this element.	In – Dewatering can potentially alter this element.	In – Hydrostatic testing can potentially cause alterations to this element.
Priority Hazardous Substances	Out – Trenchless crossings are not expected to cause alterations to this element.	In – Open cut crossing can potentially alter this element.	Out – Riparian vegetation clearance is not expected to cause alterations to this element.	Out – Temporary watercourse crossing is not expected to cause alterations to this element.	In – Dewatering can potentially alter this element.	In – Hydrostatic testing can potentially cause alterations to this element.
Hydromorphological						
Depth Variation	Out – Trenchless crossings are not	Out – Open cut crossing is not expected to cause alterations to this element.	Out – Riparian vegetation clearance is not expected	Out – Temporary watercourse crossing is	Out – Dewatering is not expected to cause alterations to this element.	Out – Hydrostatic testing is not expected to cause alterations to this element.

WFD Quality Element	Activities					
	Trenchless crossings	**Open Cut Crossing**	**Riparian Vegetation clearance**	**Temporary watercourse crossing**	**Dewatering**	**Hydrostatic testing**
	Water bodies					
	Ince Marshes, Gowy, Stanney Mill Brook, SUC, Finchetts Gutter, Sandycroft Drain, Dee (N.Wales)	*Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, Dee(N.Wales)*	*Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, Dee(N.Wales)*	*Ince Marshes, Gowy, Stanney Mill Brook, Finchetts Gutter, Garden City Drain, Wepre Brook, Dee (N. Wales)*	*Ince Marshes, Mersey, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, Dee (N.Wales)*	*Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, SUC, Wepre Brook, Dee(N.Wales)*
	expected to cause alterations to this element.		to cause alterations to this element.	not expected to cause alterations to this element.		
Quality, Structure and Substrate of the Bed	Out – Trenchless crossings are not expected to cause alterations to this element.	In – Open cut crossing can potentially alter this element.	In – Riparian vegetation clearance can potentially alter this element.	Out – Temporary watercourse crossing is not expected to cause alterations to this element.	Out – Dewatering is not expected to cause alterations to this element.	Out – Hydrostatic testing is not expected to cause alterations to this element.
Structure of the Intertidal Zone	Out – Trenchless crossings are not expected to cause alterations to this element.	Out – Open cut crossing is not expected to cause alterations to this element.	Out – Riparian vegetation clearance is not expected to cause alterations to this element.	Out – Temporary watercourse crossing is not expected to cause alterations to this element.	Out – Dewatering is not expected to cause alterations to this element.	Out – Hydrostatic testing is not expected to cause alterations to this element.
Freshwater Zone	Out – Trenchless crossings are not expected to cause alterations to this element.	Out – Open cut crossing is not expected to cause alterations to this element.	Out – Riparian vegetation clearance is not expected to cause alterations to this element.	Out – Temporary watercourse crossing is not expected to cause alterations to this element.	Out – Dewatering is not expected to cause alterations to this element.	Out – Hydrostatic testing is not expected to cause alterations to this element.
Wave Exposure	Out – Trenchless crossings are not expected to cause alterations to this element.	Out – Open cut crossing is not expected to cause alterations to this element.	Out – Riparian vegetation clearance is not expected to cause alterations to this element.	Out – Temporary watercourse crossing is not expected to cause alterations to this element.	Out – Dewatering is not expected to cause alterations to this element.	Out – Hydrostatic testing is not expected to cause alterations to this element.

Table 3.4: Scoping of surface, transitional, and coastal WFD quality elements for the Operational Stage

WFD Quality Element	Activities		
	Culvert replacement and extension	**Installation of AGIs**	**Drainage and outfalls**
	Water bodies		
	Ince Marshes	*Ince Marshes*	*Ince Marshes, Manchester Ship Canal, Mersey, Finchetts Gutter, Wepre Brook, Swinchiard Brook, Dee (N. Wales)*
Surface water / Transitional / Coastal			
Biological			
Fish	In – Culvert replacement and extension could potentially impact this element	Out – Installation of AGIs is not expected to cause alterations to this element.	In – Drainage and outfalls could potentially impact this element.
Invertebrates	Out – Culvert replacement and extension is not expected to cause alterations to this element	Out – Installation of AGIs is not expected to cause alterations to this element.	In – Drainage and outfalls could potentially impact this element.
Macrophytes & Phytoplankton	Out – Culvert replacement and extension is not expected to cause alterations to this element	Out – Installation of AGIs is not expected to cause alterations to this element.	Out – Drainage and outfalls is not expected to cause alterations to this element.
Surface water			
Physico-chemical			
Thermal Conditions	In – Culvert replacement and extension can cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	In – Drainage and outfalls can cause alterations to this element.
Oxygenation Conditions	In – Culvert replacement and extension can cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	In – Drainage and outfalls can cause alterations to this element.
Salinity	Out – Culvert replacement and extension is not expected to cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	Out – Drainage and outfalls are not expected to cause alterations to this element.
Acidification Status	Out – Culvert replacement and extension is not expected to cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	In – Drainage and outfalls can cause alterations to this element.
Nutrient Conditions	In – Culvert replacement and extension can cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	In – Drainage and outfalls can cause alterations to this element.
Priority Hazardous Substances	Out – Culvert replacement and extension is not expected to cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	In – Drainage and outfalls can cause alterations to this element.
Hydromorphology			
Quantity and Dynamics of Flow	In – Culvert replacement and extension can cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	In – Drainage and outfalls can cause alterations to this element.

WFD Quality Element	Activities		
	Culvert replacement and extension	Installation of AGIs	Drainage and outfalls
	Water bodies		
	Ince Marshes	*Ince Marshes*	*Ince Marshes,* *Manchester Ship Canal,* *Mersey,* *Finchetts Gutter,* *Wepre Brook,* *Swinchiard Brook,* *Dee (N. Wales)*
Connection to Groundwater	Out – Culvert replacement and extension is not expected to cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	Out – Drainage and outfalls are not expected to cause alterations to this element.
River Continuity	In – Culvert replacement and extension can cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	In – Drainage and outfalls can cause alterations to this element.
River Depth and Width Variation	In – Culvert replacement and extension can cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	In – Drainage and outfalls can cause alterations to this element.
Structure and Substrate of the River Bed	In – Culvert replacement and extension can cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	In – Drainage and outfalls can cause alterations to this element.
Structure of the Riparian Zone	In – Culvert replacement and extension can cause alterations to this element.	In – Installation of AGIs can cause alterations to this element (Ince Marshes only)	In – Drainage and outfalls can cause alterations to this element.
Transitional /coastal			
Physico-chemical			
Transparency	Out – Culvert replacement and extension is not expected to cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	In – Drainage and outfalls can cause alterations to this element.
Thermal Conditions	Out – Culvert replacement and extension is not expected to cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	In – Drainage and outfalls can cause alterations to this element.
Oxygenation Conditions	Out – Culvert replacement and extension is not expected to cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	Out – Drainage and outfalls are not expected to cause alterations to this element.
Nutrient Conditions	Out – Culvert replacement and extension is not expected to cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	Out – Drainage and outfalls are not expected to cause alterations to this element.
Priority Hazardous Substances	Out – Culvert replacement and extension is not expected to cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	In – Drainage and outfalls can cause alterations to this element.
Hydromorphology			
Depth Variation	Out – Culvert replacement and extension is not expected to cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	Out – Drainage and outfalls are not expected to cause alterations to this element.
Quality, Structure and Substrate of the Bed	Out – Culvert replacement and extension is not expected to cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	Out – Drainage and outfalls are not expected to cause alterations to this element.

WFD Quality Element	Activities		
	Culvert replacement and extension	Installation of AGIs	Drainage and outfalls
	Water bodies		
	Ince Marshes	*Ince Marshes*	*Ince Marshes, Manchester Ship Canal, Mersey, Finchetts Gutter, Wepre Brook, Swinchiard Brook, Dee (N. Wales)*
Structure of the Intertidal Zone	Out – Culvert replacement and extension is not expected to cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	Out – Drainage and outfalls are not expected to cause alterations to this element.
Freshwater Zone	Out – Culvert replacement and extension is not expected to cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	Out – Drainage and outfalls are not expected to cause alterations to this element.
Wave Exposure	Out – Culvert replacement and extension is not expected to cause alterations to this element.	Out – Installation of AGIs is not expected to cause alterations to this element.	Out – Drainage and outfalls are not expected to cause alterations to this element.

Table 3.5: Scoping of groundwater WFD quality elements for Construction Stage activities

WFD Quality Element	Trenchless crossing	Open cut crossing	Riparian vegetation clearance	Temporary watercourse crossing	Dewatering
Quantitative					
Saline Intrusion	Out- Due to temporary nature of the trenchless crossing works, no sustained upward trend of saline intrusion	Out- Due to temporary nature of open cut crossings, no sustained upward trend of saline intrusion	Out- No impact	Out- Due to temporary nature of works, no sustained upward trend of saline intrusion	Out- Due to temporary nature of dewatering, no sustained upward trend of saline intrusion
Water Balance	Out- Due to temporary nature of trenchless crossing works, no change to overall groundwater balance	Out- Due to temporary nature of open cut crossings, no change to overall groundwater balance	Out- No impact	Out- Due to temporary nature of works, no change to overall groundwater balance	Out- Due to temporary nature of dewatering, no change to overall groundwater balance
GWDTEs	Out- Due to temporary nature of trenchless crossing works, no sustained change of water supply to GWDTE. Identified GWDTE have low groundwater dependency	Out- Due to temporary nature of open cut crossings, no sustained change of water supply to GWDTE. Identified GWDTE have low groundwater dependency	Out- No impact	Out- Due to temporary nature of works, no sustained change of water supply to GWDTE. Identified GWDTE have low groundwater dependency	Out- Due to temporary nature of dewatering, no sustained change of water supply to GWDTE. Identified GWDTE have low groundwater dependency
Dependent Surface Water Body	Out- Due to temporary nature of trenchless crossing works, no sustained impact on dependent surface water bodies	Out- Due to temporary nature of open cut crossings, no sustained impact on dependent surface water bodies	Out- No impact	Out- Due to temporary nature of works, no sustained impact on dependent surface water bodies	Out- Due to temporary nature of dewatering, no sustained impact on dependent surface water bodies

WFD Quality Element	Trenchless crossing	Open cut crossing	Riparian vegetation clearance	Temporary watercourse crossing	Dewatering
Chemical					
Drinking Water Protected Area	Out- trenchless crossing works not within a Drinking Water Protected area.	Out- Open cut crossings not within a Drinking Water Protected area.	Out- No impact	Out- Open works are not within a Drinking Water Protected area.	Out- Dewatering works not within a Drinking Water Protected area.
General Chemical Test	Out- No deterioration of water quality due to temporary nature of trenchless crossing works and implementation of CEMP.	Out- No deterioration of water quality due to temporary nature of open cut crossings and implementation of CEMP.	Out- No impact	Out- No deterioration of water quality due to temporary nature of open cut crossings and implementation of CEMP.	Out- No deterioration of water quality due to temporary nature of dewatering works and implementation of CEMP.
Chemical GWDTEs	Out- The chemical contribution during the trenchless crossing works will not significantly impact the GWDTE. Identified GWDTE have low groundwater dependency	Out- The chemical contribution during the open cut crossings will not significantly impact the GWDTE. Identified GWDTE have low groundwater dependency	Out- No impact	Out- The chemical contribution during the works will not significantly impact the GWDTE. Identified GWDTE have low groundwater dependency	Out- The chemical contribution during the dewatering will not significantly impact the GWDTE. Identified GWDTE have low groundwater dependency
Chemical Dependent Surface Water Body Status	Out- Due to temporary nature of trenchless crossing works, no sustained chemical impact on dependent surface water bodies	Out- Due to temporary nature of open cut crossings, no sustained chemical impact on dependent surface water bodies	Out- No impact	Out- Due to temporary nature of works, no sustained chemical impact on dependent surface water bodies	Out- Due to temporary nature of dewatering, no sustained chemical impact on dependent surface water bodies
Saline Intrusion	Out- Due to temporary nature of the trenchless crossing works, no sustained upward trend of saline intrusion	Out- Due to temporary nature of the open cut crossings, no sustained upward trend of saline intrusion	Out- No impact	Out- Due to temporary nature of the works, no sustained upward trend of saline intrusion	Out- Due to temporary nature of the dewatering, no sustained upward trend of saline intrusion

Table 3.6: Scoping of groundwater WFD quality elements for the Operational Stage

WFD Quality Element	Culvert replacement and extension	Installation of AGIs	Installation of BVS	Drainage and Outfalls
Quantitative				
Saline Intrusion	Out- No impact on saline intrusion	Out- No impact on saline intrusion	Out- No impact on saline intrusion	Out- No impact on saline intrusion
Water Balance	Out- Would not result in a significant change to groundwater balance	Out- Minimal or no excavation within groundwater. Would not result in a significant change to water balance	Out- Would not result in a significant change to the groundwater balance	Out- Would not result in a significant change to groundwater balance
GWDTEs	Out- Would not result in a sustained change of water supply to GWDTE. Identified GWDTE have low groundwater dependency	Out- No AGI would result in a sustained change of water supply to GWDTE. Identified GWDTE have low groundwater dependency	Out- No BVS would result in a sustained change of water supply to GWDTE. Identified GWDTE have low groundwater dependency	Out- Would not result in a sustained change of water supply to GWDTE. Identified GWDTE have low groundwater dependency
Dependent Surface Water Body	Out- No change is expected to the dependency of surface water bodies on groundwater	Out- No change is expected to the dependency of surface water bodies on groundwater	Out- Would not result in a significant change to the dependency of surface water bodies	Out- No change is expected to the dependency of surface water bodies on groundwater
Drinking Water Protected Area	Out- No infrastructure within a Drinking Water Protected area.	Out- No AGI within a Drinking Water Protected area.	Out- No BVS within a Drinking Water Protected area.	Out- No infrastructure within a Drinking Water Protected area.

WFD Quality Element	Culvert replacement and extension	Installation of AGIs	Installation of BVS	Drainage and Outfalls
Chemical				
General Chemical Test	Out- No deterioration of groundwater body quality is expected from culvert replacement or extension	Out- No deterioration of groundwater body quality is expected from the AGIs due to pollution control measures and SUDs design	Out- No deterioration of groundwater body quality is expected from the BVS due to pollution control measures and SUDs design	Out- No deterioration of groundwater body quality is expected from drainage and outfalls due to pollution control and SUDs design
Chemical GWDTEs	Out- The chemical contribution of culvert replacement and extension will not significantly impact GWDTE. Identified GWDTE have low groundwater dependency.	Out- The chemical contribution of AGIs will not significantly impact GWDTE. Identified GWDTE have low groundwater dependency.	Out- The chemical contribution of BVS will not significantly impact GWDTE. Identified GWDTE have low groundwater dependency.	Out- The chemical contribution of drainage and outfalls will not significantly impact GWDTE. Identified GWDTE have low groundwater dependency.
Chemical Dependent Surface Water Body Status	Out- No change chemically is expected to the dependency of surface water bodies on groundwater.	Out- No change chemically is expected to the dependency of surface water bodies on groundwater due to pollution control measures and SUDs design.	Out- No change chemically is expected to the dependency of surface water bodies on groundwater due to pollution control measures and SUDs design.	Out- No change chemically is expected to the dependency of surface water bodies on groundwater.
Saline Intrusion	Out- No impact on saline intrusion.	Out- No impact on saline intrusion.	Out- No impact on saline intrusion.	Out- No impact on saline intrusion.

3.2.3. The scoping of the WFDa of transitional and coastal water bodies uses the methodology provided by the Environment Agency (**Ref. 2.32**) and the scoping results are presented in **Annex B**. A summary of this scope exercise is presented in **Table 3.7** below.

Table 3.7: Summary of Scoping of transitional/coastal water bodies

Receptor	Potential Risk to receptor?	Note the potential impacts to be assessed
Dee (N. Wales) Transitional (GB531106708200)		
Hydromorphology	Yes	Increased sedimentation from construction activities
Biology: habitat	Yes	Footprint of DCO Proposed Development activities within 500m of a higher sensitivity habitat (Saltmarsh).
Biology: fish	Yes	Vibration, noise and pollution from construction activities.
Water quality	Yes	Sediment mobilisation and chemical pollution from construction activities
Protected areas	Yes	DCO Proposed Development within 2km of Mersey Estuary SPA; Dee Estuary SAC, SPA and SSSI
Invasive non-native species	Yes	Potential spread of INNS through construction activities.

4. BASELINE CONDITIONS

4.1.1. All the watercourses and water bodies screened into the assessment are listed in **Table 4.1.**

4.1.2. Table 4.1presents the WFD water bodies in which each of the watercourses are located, the current overall WFD, ecological and chemical status, and their River Condition Score, as determined through the surveys and desk study completed in April, May and June 2022.

4.1.3. Whilst groundwater WFD water bodies were scoped out due to no anticipated impacts to groundwater quality elements in Section 3 above, Table 4.2 presents the overall WFD, quantitative and chemical status for each groundwater body in order to provide some high-level groundwater baseline information. Groundwater is not assessed further and therefore no detailed groundwater baseline is provided.

4.1.4. A full suite of baseline information for each watercourse being carried forward for detailed assessment is provided in Annex C. This presents the baseline data for all WFD quality elements scoped into the assessment for each water body.

Table 4.1: WFD status of watercourses and surface water bodies screened into this assessment

Watercourse Name	Water body Name and ID	Watercourse Type	Overall Status	Ecological Status	Chemical Status	Overall Objective	River Condition Score
East Central Drain	Peckmill Brook, Hoolpool Gutter and Ince Marshes (GB112068060330)	Main River	Moderate	Moderate	Fail	Poor in 2015 Disproportionately expensive: Disproportionate burdens. Technically infeasible: No known technical solution is available	Moderate
Elton Lane Ditch 1		Ditch					Fairly Poor
Elton Lane Ditch 4		Ditch					Moderate
Elton Lane South Ditch		Ditch					Poor
Elton Marsh 1 and 2		Ditch					Poor
West Central Drain		Main River					Fairly Poor
Hapsford Brook		Main River					Moderate
Elton Brook Tributary 1	Mersey (GB531206908100)	Ditch	Moderate	Moderate	Fail	Good by 2027	Poor
Gale Brook		Main River					Moderate

Watercourse Name	Water body Name and ID	Watercourse Type	Overall Status	Ecological Status	Chemical Status	Overall Objective	River Condition Score
Thornton Uplands		Main River					Fairly Poor
Halls Green Lane Ditch West		Ditch					Poor
Mersey		Transitional					-
Thornton Main Drain	Gowy (Milton Brook to Mersey) (GB112068060250)	Main River	Moderate	Moderate	Fail	Moderate by 2027	Fairly Poor
Gowy		Main River					Moderate
Stanney Main Drain		Main River					Moderate
Stanney Mill Brook	Stanney Mill Brook (GB112068060260)	Main river	Moderate	Moderate	Fail	Good by 2027	Fairly Poor
Gowy Tributary 2		Ordinary Watercourse					Moderate
Wervin Hall Ditch Tributary		Ditch					Poor
Shropshire Union Canal	Shropshire Union Canal (GB71210133)	Canal (Artificial)	Moderate	Moderate	Fail	Good by 2021	Fairly Poor

Watercourse Name	Water body Name and ID	Watercourse Type	Overall Status	Ecological Status	Chemical Status	Overall Objective	River Condition Score
Manchester Ship Canal	Manchester Ship Canal (GB71210004)	Canal (Artificial)	Moderate	Moderate	Fail	Good by 2027	-
Collinge Wood Brook	Finchetts Gutter (GB111067056930)	Ditch	Poor	Poor	Fail	Good by 2027	No survey (classed as a hedgerow ditch)
Rake Lane Brook		Ordinary Watercourse					Moderate
Backford Brook		Main River					Fairly Good (upstream reach) Poor (downstream reach)
Friars Park Ditch		Ordinary Watercourse					Fairly Good
Gypsy Lane Brook		Ditch					No survey (classed as a hedgerow ditch)

Watercourse Name	Water body Name and ID	Watercourse Type	Overall Status	Ecological Status	Chemical Status	Overall Objective	River Condition Score
Overwood Ditch		Ditch					Poor
Finchetts Gutter Tributary		Ordinary Watercourse					Fairly good - moderate
Sealand Main Drain		Main River					Fairly Poor
Seahill Tributary 2	Garden City Drain (GB111067056960)	Ordinary Watercourse	Moderate	Moderate	Fail	Good by 2027	Fairly Poor
Seahill Drain		Main River					Fairly Poor
Railway Ditches	Sandycroft Drain (GB111067052160)	Ditch	Moderate	Moderate	Good	Good by 2021	No data – dry at the time of survey
Broughton Brook		Main River					Fairly Poor
Sandycroft Drain		Main River					Fairly Poor
Mancot Brook		Ordinary Watercourse					Moderate

Watercourse Name	Water body Name and ID	Watercourse Type	Overall Status	Ecological Status	Chemical Status	Overall Objective	River Condition Score
Chester Road Drain North		Main River					Poor
Chester Road Drain Tributary 1		Main River					Fairly poor
New Inn Brook	Wepre Brook (GB111067056880)	Ordinary Watercourse	Moderate	Moderate	Good	Good by 2027	Fairly good
Alltami Brook		Ordinary Watercourse					Fairly good
Wepre Brook		Ordinary Watercourse					Fairly poor - Moderate
Dee Estuary	Dee (N. Wales) (GB531106708200)	Transitional	Moderate	Moderate	Fail	Good by 2021	Moderate
Hawarden Brook		Main River					No landowner access granted
Willow Park Brook		Ordinary Watercourse					Moderate
Aston Hall Brook		Ordinary Watercourse					Fairly Poor

Watercourse Name	Water body Name and ID	Watercourse Type	Overall Status	Ecological Status	Chemical Status	Overall Objective	River Condition Score
Northop Brook		Ordinary Watercourse					Moderate
Little Lead Brook		Ordinary Watercourse					Moderate
Nant-y-Fflint	Swinchiard Brook (GB111067056940)	Ordinary Watercourse	Good	Good	High	Good by 2015	Fairly Good

Table 4.2: WFD status of ground water bodies screened into this assessment

Groundwater body	Water body ID	Overall Status	Quantitative	Chemical	Overall Objective
Wirral and West Cheshire Permo-Triassic Sandstone Aquifers Water Body	GB41101 G202600	Poor	Good	Poor	Good by 2027
Dee Permo-Triassic Sandstone Water Body	GB41101 G202400	Poor	Good	Poor	Good by 2015
Dee Carboniferous Coal Measures	GB41102 G204800	Poor	Good	Poor	Poor by 2015
Clwyd Carboniferous Limestone	GB41001 G200300	Good	Good	Good	Good by 2015

5. DETAILED IMPACT ASSESSMENT

5.1. STEP 1: POTENTIAL GENERIC OPERATIONAL IMPACTS OF THE DCO PROPOSED DEVELOPMENT ON WFD QUALITY ELEMENTS

5.1.1. Potential pressures and impacts of the DCO Proposed Development have been identified along with embedded mitigation measures and are presented in **Table 5.1**. The proposed mitigation thus forms the basis of this assessment.

Table 5.1: Pressures, potential impacts and associated mitigation for works to the impacted watercourses and downstream water bodies (Ref. 5.1)

Pressure	Sub-pressure	Potential Impacts	Mitigation Measures
Online structures	Culverts Outfalls	Loss of morphological diversity and habitat. Hard protection and associated impacts. Impediment to fish/mammal passage and ecological connectivity. Loss of aquatic, marginal and riparian habitat. Initiation of geomorphic response.	Most proposed culverts would be for temporary watercourse crossings only and would be removed following construction. Bed and banks would be reinstated to baseline as far as practicable. Installation of both temporary and permanent culverts would ensure avoidance of sensitive fish migration and spawning periods and that the culverts are designed/installed to Environment Agency Fish Pass standards (**Ref. 5.2**) to facilitate passage of eel, lamprey, salmonids and coarse fish species. A permanent culvert replacement and extension is required. Best-practice culvert design would be adopted and construction impacts mitigated through the CEMP. Riparian enhancements would be implemented to improve habitat along the ditch as far as practicable. Outfalls are required as part of the drainage strategy (refer to the **Surface Water Drainage Strategy Report, Document reference: D.6.5.13**). The outfall headwalls would be set-back from the bank face and connected to the watercourse via an open channel. This would avoid the need for hard bank protection on the bank face and allow for naturalised aquatic and amphibious vegetation to establish.
Channel alteration	Realignment/ re-profiling/ regrading	Loss of morphological diversity and habitat due to a potential 32m wide disruption	Retain/reinstate marginal aquatic and riparian habitats as far as practicable. Retain/reinstate bank face and bank top vegetation structure and assemblage using an appropriate native species mix as far as practicable.

Pressure	Sub-pressure	Potential Impacts	Mitigation Measures
		to watercourse connectivity for trenched crossings	Retain/reinstate bank profiles to baseline conditions as far as practicable. Retain/reinstate in-channel morphological diversity (e.g., channel sinuosity, riffles, pools, point/side bars, berms) as far as practicable.
Floodplain modification	Introduction of impermeable areas	Loss of riparian zone/ marginal habitat/ loss of lateral connectivity/ changes to sediment input	Provide enhancements to the riparian zone where practicable to improve connectivity. The Construction Contractor will undertake further consultation with the Environment Agency's, Natural Resources Wales' and the Lead Local Flood Authorities' Planning and Geomorphology Technical Specialists to determine the appropriate depth and extent of the pipeline placement so as not to prevent the future re-naturalisation of the Alltami Brook and River Gowy.
Operations and maintenance	Pipes, and outfalls	Hydromorphological alterations of water and sediment inputs through artificial means	Appropriate techniques to align and attenuate flow to limit detrimental effects of these features

5.2. STEP 2: SITE-SPECIFIC ASSESSMENT OF THE DCO PROPOSED DEVELOPMENT AGAINST WFD QUALITY ELEMENTS

5.2.1. Site-specific assessments of the DCO Proposed Development against WFD Quality Elements are summarised below for every activity which may cause a potential impact. The proposed activities with potential impact to the WFD quality elements are trenchless crossing (**Table 5-2**), open cut crossing (**Table 5-3**), riparian vegetation clearance (**Table 5-4**), temporary watercourse crossing (**Table 5-5**), dewatering (**Table 5-6**), hydrostatic testing (**Table 5-7**), culvert replacement/extension (**Table 5-8**), AGIs (**Table 5-9**), and drainages and outfalls (**Table 5-10**).

5.2.2. A list of activities proposed on individual watercourses within each WFD water body assessed is provided in Annex D.

5.2.3. The proposed mitigation for potential impacts is provided in the REAC (Document **reference: D.6.5.1)**, contained in the **OCEMP (Document reference: D.6.5.4)** and is summarised in **Section 6.**

5.2.4. Further details on the reinstatement specification guiding principles for watercourses are provided in **Annex E**.

TRENCHLESS CROSSING

Table 5.2: Impact on the WFD Quality elements from trenchless crossing on relevant water bodies

Quality Element	Potential Impact	Mitigation
Relevant water bodies: Ince Marshes, Gowy, Stanney Mill Brook, SUC, Finchetts Gutter, Sandycroft Drain, and Dee (N.Wales)		
Surface water and Transitional/Coastal		
Biological		
Macrophytes & Phytoplankton	**Generic Impacts** Trenchless crossing can potentially result in chemical (primarily bentonite) and light pollution, which can cause loss or damage to macrophytes and their habitats. Only watercourses within the Gowy and SUC water bodies are potentially impacted during the Construction Stage.	**Generic Mitigation** Pits are to be positioned as far back as practicable from the watercourse and backfilled on completion of the works. **OCEMP (Document reference: D.6.5.4)** will include measures to control pollution, and an appropriate lighting design whereby artificial light does not spill the full width of affected watercourses. Therefore, given the localised nature of this activity and implementation of mitigation measures, the impact of trenchless crossings is not expected to cause significant alteration to macrophytes at the WFD water body scale. **Site Specific Mitigation** *River Dee* Alongside generic mitigation, the Newbuild Carbon Dioxide Pipeline is to be laid at a depth of 15m below the River Dee. This reduces the likelihood of chemical pollution entering the watercourse as a result of blowouts. Additionally, due to the tidal characteristics present at the proposed crossing point, and increased buffering capacity of the downstream estuary, the impact of any pollution is likely to be minimal. With this mitigation in place, no significant alteration to macrophytes and phytoplankton is expected at the WFD water body scale.
Invertebrates	**Generic Impacts** Trenchless crossing can potentially result in chemical (bentonite) and light pollution, which can cause loss or damage to invertebrates and their habitats. Only watercourses within the Gowy, Stanney Mill Brook, Sandycroft Drain and Dee (N.Wales) water bodies are potentially impacted during the Construction Stage.	**Generic Mitigation** Pits are to be positioned as far back as practicable from the watercourse and backfilled on completion of the works. **OCEMP (Document reference: D.6.5.4)** will include measures to control pollution, and an appropriate lighting design whereby artificial light does not spill the full width of affected watercourses. Therefore, given the localised nature of this activity and implementation of mitigation measures, the impact of trenchless crossings is not expected to cause significant alteration to invertebrates at the WFD water body scale. **Site Specific Mitigation** *River Dee* Alongside generic mitigation, the Newbuild Carbon Dioxide Pipeline to be laid at a depth of 15m below the River Dee. This reduces the likelihood of chemical pollution entering the watercourse as a result of blowouts. Additionally, due to the tidal characteristics present at the proposed crossing point, and increased buffering capacity of the downstream estuary, the impact of any pollution is likely to be minimal. With this mitigation in place, no significant alteration to invertebrates is expected at the WFD water body scale.

Quality Element	Potential Impact	Mitigation
Fish	**Generic Impacts** Trenchless crossing can potentially result in the following impacts during the Construction Stage, which may cause direct damage, disturbance, and the loss, abandonment and/or fragmentation of habitats: • Chemical pollution, primarily bentonite from blowouts/spillage; • Artificial light pollution; • Vibration and noise from drilling and pile driving; and • Impediment of fish passage by access routes and causeways.	**Generic Mitigation** The following procedures would be implemented to mitigate the effects of trenchless crossings: • Implementation of a Noise and Vibration Management Plan. This is to include a) Utilisation of press or vibratory pile driving methods, b) Soft-starts to pile driving to allow for fish dispersal, and c) Phased or intermittent works schedule (break periods) to allow for recovery windows (**D-BD-059 of the REAC, Document reference:D.6.5.1**); • Pits would be positioned as far back as practicable from watercourse, and backfilled on completion of the works; • All temporary access routes/causeways spanning watercourses would adhere to the Environment Agency's fish pass standards (**D-BD-053 of the REAC, Document reference:D.6.5.1**); • Implementation of the **OCEMP (Document reference: D.6.5.4)**, which would include pollution control measures, and an appropriate lighting design whereby artificial light does not spill the full width of affected watercourses; and, • Where practical and reasonable, timings of works scheduled to avoid sensitive lifecycle stages (migration and spawning) (**D-BD-058 of the REAC, Document reference:D.6.5.1**); Therefore, given the localised nature of this activity and implementation of mitigation measures, the impact of trenchless crossings is not expected to cause significant alteration to fish at the WFD water body scale. **Site Specific Mitigation** *River Dee* Alongside generic mitigation, the Newbuild Carbon Dioxide Pipeline is to be laid at a depth of 15m below the River Dee. This reduces the likelihood of chemical pollution entering the watercourse as a result of blowouts. Additionally, due to the tidal characteristics present at the proposed crossing point, and increased buffering capacity of the downstream estuary, the impact of any pollution is likely to be minimal. The increased depth of the Newbuild Carbon Dioxide Pipeline will also reduce the impact of vibration and surface noise on fish, as excavation pits will need to be located a at least 16m from the watercourse compared to usual operative depths. Where practical and reasonable, timings of works will be scheduled so not to conflict with the seasonal constraints associated with estuarine environments. With this mitigation in place, no significant alteration to fish is expected at the WFD water body scale.
<u>Surface water</u>		
<u>Physico-Chemical</u>		
Oxygenation Conditions	**Generic Impacts** Trenchless crossing can potentially disrupt the hyporheic zone underneath the watercourses, therefore, impacting water and oxygen flow	**Generic Mitigation** Trenchless crossings are not expected to cause significant alteration in oxygenation conditions in any affected watercourses or at the WFD water body scale if the **OCEMP (Document reference: D.6.5.4)** and correct

Quality Element	Potential Impact	Mitigation
	between ground and surface zones during the Construction Stage.	installation methods are followed. With this mitigation in place, no significant alteration to oxygenation conditions is expected at the WFD water body scale.
Priority Hazardous Substances	**Generic Impacts** Trenchless crossing can potentially disrupt the alluvial sediments underneath the watercourses, hence, releasing hazardous substances to the ground and surface water flow during the Construction Stage.	**Generic Mitigation** Trenchless crossings are not expected to cause significant alteration in Priority Hazardous Substances in any affected watercourses or at the WFD water body scale if the **OCEMP (Document reference: D.6.5.4)** and correct installation methods are followed. With this mitigation in place, no significant alteration to hazardous substances is expected at the WFD water body scale.
<u>Hydromorphological</u>		
River Continuity	**Site Specific Impacts** *River Gowy* Only the River Gowy trenchless crossing is scoped in for river continuity and no impacts are anticipated on the other WFD water bodies where trenchless methods are proposed. Future plans to set-back the embankments on the River Gowy floodplain and re-naturalisation of the river to a sinuous planform could result in the proposed pipeline becoming exposed by fluvial processes. Therefore, this poses a potential operational impact.	**Site Specific Mitigation** *River Gowy* The Construction Contractor will undertake further engagement with the Environment Agency Planning and Geomorphology Technical Specialists during the Detailed Design process to determine the required floodplain extent for pipeline burial depth below the existing river bed level of the Rover Gowy. This will determine the potential distance for setting back of the embankments along the River Gowy to allow for the WFD Mitigation Measure to be achieved (**D-WR-055** of the **REAC, Document reference: D.6.5.1**). This mitigation is required to enable the re-naturalisation of a sinuous planform of the River Gowy, as depicted in historical mapping records, without the risk of the pipeline becoming exposed. An allowance of 100m has been made within the Newbuild Infrastructure Boundary for this to be developed at detailed design. With this mitigation in place, no adverse impact in river continuity is anticipated at the WFD water body scale.
River Depth and Width Variation	**Site Specific Impacts** *River Gowy* Only the River Gowy trenchless crossing is scoped in for river depth and width variation and no impacts are anticipated on the other WFD water bodies where trenchless methods are proposed. Future plans to set-back the embankments on the River Gowy floodplain and re-naturalisation of the river to a sinuous planform could result in the Newbuild Carbon Dioxide Pipeline becoming exposed by fluvial processes. Therefore, this poses a potential operational impact.	**Site Specific Mitigation** *River Gowy* **D-WR-055** of the **REAC, Document reference: D.6.5.** This mitigation is required to enable the re-naturalisation of a sinuous planform of the River Gowy, as depicted in historical mapping records, without the risk of the Newbuild Carbon Dioxide Pipeline becoming exposed. With this mitigation in place, no adverse impact in river width and depth is anticipated at the WFD water body scale.

OPEN CUT CROSSING

Table 5.3: Impact on the WFD Quality elements from open cut crossings on relevant water bodies

<table>
<tr><th>Quality Element</th><th>Potential Impact</th><th>Mitigation</th></tr>
<tr><td colspan="3">Relevant water bodies: Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, and Dee (N. Wales)</td></tr>
<tr><td colspan="3"><u>Surface water and Transitional/Coastal</u></td></tr>
<tr><td colspan="3"><u>Biological</u></td></tr>
<tr><td>Macrophytes & phytoplankton</td><td>Generic Impacts

Open cut crossings can cause damage or death to macrophytes and phytoplankton via direct removal and loss and/or degradation of habitats. Only watercourses within the Gowy and Finchetts Gutter water bodies are potentially impacted during the Construction Stage.</td><td>Generic Mitigation

Generally, the baseline macrophyte diversity was poor across the impacted water bodies, characterised by common, non-protected species that are well established upstream of the Newbuild Infrastructure Boundary. Therefore, whilst macrophytes and phytoplankton will be lost during construction, these species are likely to re-establish naturally. Nevertheless, the following procedures are to be implemented to mitigate the impact on macrophytes and phytoplankton:

• A minimal working width will be adopted as far as practicable to minimise the potential impacts of open cut watercourse crossings (D-WR-049 of the REAC, Document reference:D.6.5.1)
• Channel and banks will be reinstated to mimic baseline conditions as far as practicable to ensure more natural bank forms and in-channel features and morphological diversity. This includes reinstatement of an appropriate vegetation assemblage and structure within the riparian zone along with enhancements to the riparian zone to off-set impacts. Any tree loss would be compensated for in accordance with the site wide replanting strategy (D-WR-047 of the REAC, Document reference:D.6.5.1
• Where practicable, any habitats that have been removed will be reinstated, such as riffles, pools, point bars, berms, large wood, log jams, cross-sectional and planform variation. Any reinstatement will be ensured to not cause other potential impacts, such as increase flood risk (D-WR-051 of the REAC, Document reference:D.6.5.1)
• Any watercourses interrupted during excavation would be temporarily diverted or serviced with pumps to bypass the excavated section (D-WR-029 of the REAC, Document reference: D.6.5.1);
• During any river dewatering and/or in-channel working, an ecological watching brief and fish rescue plan will be employed. Where areas are required to be temporarily dewatered to facilitate construction activities, fish will be removed by means of electrofishing under Environment Agency or NRW consent and relocated upstream prior to dewatering Suitable temporary channels may be implemented to divert water during culvert construction works. Any environmental permit(s) shall be obtained and in place prior to the creation of a temporary dry channel. The construction of a temporary dry channel shall be undertaken in accordance with the mitigation measures contained within the Detailed CEMPs and any other relevant measures prescribed by granted permits from NRW/EA. Works will be subsequently undertaken under Ecological Clerk of Works (ECoW) supervision. A pump may be required to divert flows during construction. Where this occurs, the ECoW shall be in attendance and a 2 mm screen fitted on the transfer intake to minimise the risk of fish and eel entrainment (D-BD-061 of the REAC, Document reference: D.6.5.1),and,
• Implementation of the OCEMP (Document reference: D.6.5.4), which would include pollution control measures, and an appropriate lighting design whereby artificial light does not spill the full width of affected watercourses.

Therefore, by applying these mitigation measures, no impact to macrophytes is predicted at the WFD water body scale.</td></tr>
<tr><td>Invertebrates</td><td>Generic Impacts</td><td>Generic Mitigation</td></tr>
</table>

<table>
<tr><th>Quality Element</th><th>Potential Impact</th><th>Mitigation</th></tr>
<tr><td></td><td>Open cut crossings can cause direct damage or death to invertebrates, and the loss, degradation and fragmentation of habitats. Only watercourses within the Mersey, Ince Marshes, Gowy, Finchetts Gutter, Garden City Drain, Sandycroft Drain and Wepre Brook water bodies are potentially impacted and during the Construction Stage.</td><td>Generally, the invertebrate communities within crossed water bodies consisted of common, non-protected species. Additionally, the habitats that may be lost during construction either extended beyond the proposed Newbuild Infrastructure Boundary or were present in upstream reaches of the watercourse. Therefore, rapid re-colonisation and re-establishment of the invertebrate community is expected. Nevertheless, the following procedures are to be implemented to mitigate the impact on invertebrates:
• D-WR-029, D-BD-061, D-WR-047, D-WR-049 and D-WR-051 of the REAC, Document reference:D.6.5.1
• Implementation of the OCEMP (Document reference: D.6.5.4), which would include pollution control measures, and an appropriate lighting design whereby artificial light does not spill the full width of affected watercourses.
Therefore, by applying these mitigation measures, no impact to invertebrates is predicted at the WFD water body scale.</td></tr>
<tr><td>Fish</td><td>Generic Impacts
Open cut crossings can cause direct damage or death, fish entrapment and/or impingement, and the loss, degradation and fragmentation of habitats. Only watercourses within the Ince Marshes, Gowy, Finchetts Gutter, Garden City Drain and Wepre Brook water bodies are potentially impacted and during the Construction Stage.

Site Specific Impacts
West Central Drain and Hapsford Brook (Ince Marshes water body)
Due to the soft, wet ground surrounding these two watercourses (Ince Marshes WFD water body), the two open cut crossings will require shoring with sheet piling, which can create vibration and noise that may cause disturbance</td><td>Generic Mitigation
The following procedures are to be implemented to mitigate the impact on fish:
• Temporary culverts and causeways/access routes will be removed as soon as practicable when no longer required (D-BD-052 of the REAC, Document reference:D.6.5.1).;
As well as the following measures from the REAC, Document reference:D.6.5.1
• D-WR-029
• D-BD-061
• D-BD-063
• D-BD-058
• D-WR-047
• D-WR-049
• D-WR-051
• Implementation of the OCEMP (Document reference: D.6.5.4), which would include pollution control measures, and an appropriate lighting design whereby artificial light does not spill the full width of affected watercourses

Site Specific Mitigation
West Central Drain and Hapsford Brook (Ince Marshes water body)
D-BD-059 of the REAC, Document reference:D.6.5.1
Therefore, by applying those mitigation measures, no impact on to fish is predicted at the WFD water body scale.</td></tr>
</table>

Quality Element	Potential Impact	Mitigation
	and/or damage to fish during the Construction Stage. *Alltami Brook (Wepre Brook water body)* The open cut crossing on Alltami Brook is expected to occur along a bedrock channel section, whereby natural bedrock material is removed and reinstated with likely a mixture of artificial and natural material, thus permanently altering the riverbed structure and substrate. Whilst the reinstatement works would allow fish passage post-construction, failure of these works in the future may create an adverse permanent impact to fish populations and potential spawning habitat, which could have a water body scale effect. Potential impacts could occur during Operation Stage.	*Alltami Brook (Wepre Brook water body)* The working width for this open cut crossing would be reduced to 16m. Within this length of the watercourse there would be removal of riparian vegetation and temporary culverting of the watercourse. The maximum width of the trench across the watercourse would be 4m, and therefore this is the length of the watercourse which would have the permanent loss of bedrock riverbed (**D-WR-063 of the REAC, Document reference: D.6.5.1**). A bespoke geomorphological assessment will be carried out by the Construction Contractor to inform: • micro-siting the crossing location of the pipe so that the least sensitive section of river bed is permanently impacted, as far as practicable, • the detailed design of the permanent works installed as part of the reinstatement of the watercourse after pipe is laid Further engagement with Natural Resources Wales and the Lead Local Flood Authority Planning would be undertaken to inform the methodology of this bespoke geomorphological assessment (**D-WR-064 of the REAC, Document reference: D.6.5.1**). Geomorphological and ecological monitoring of the permanent works would be carried out, post construction, to ensure the integrity of the reinstated channel and to identify any early intervention that may be required to ensure no deterioration in WFD status. Type, duration and frequency of monitoring is to be determined through the development of the geomorphological assessment and detailed design, and in consultation with NRW and FCC LLFA. Adaptive mitigation would be implemented to maintain the integrity of the reinstated channel (**D-WR-065 of the REAC, Document reference: D.6.5.1**). Reinstatement of riparian vegetation post-construction, planting riparian species, including trees where practicable (**D-WR-047 of the REAC, Document reference:D.6.5.1**). Therefore, by applying these mitigation measures, no significant impact on fish is foreseen for the watercourses within the Wepre Brook WFD water body at the water body scale.
<u>Surface water only</u> ***Relevant water bodies: Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Manchester Ship Canal, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook***		
<u>Physico-Chemical</u>		
Thermal Conditions	**Generic Impacts** Open cut crossings can potentially reduce the watercourse longitudinal connectivity through impoundment, hence, altering local thermal conditions during the Construction Stage.	**Generic Mitigation** Any watercourse interrupted during excavation would be temporarily diverted or serviced with pumps to bypass the excavated section. Therefore, no impact on longitudinal connectivity and thermal conditions is expected for this activity at the WFD water body scale.
Oxygenation Conditions	**Generic Impacts** Open cut crossings can potentially reduce longitudinal connectivity and flow velocity, hence, altering local oxygenation conditions during the Construction Stage.	**Generic Mitigation** Any watercourse interrupted during excavation would be temporarily diverted or serviced with pumps to bypass the excavated section. Therefore, no impact on longitudinal connectivity and oxygenation conditions is expected for this activity at the WFD water body scale.

Quality Element	Potential Impact	Mitigation
Priority Hazardous Substances	**Generic Impacts** Open cut crossings can potentially disrupt the alluvial sediments underneath the watercourses, hence, releasing hazardous substances to the ground and surface water flow during the Construction Stage.	**Generic Mitigation** The following mitigation procedures would be implemented to mitigate the impacts of potential hazardous substances being released to the channel flow: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)** (see summary in **Section 6).** • The relevant permits would be obtained for works within ordinary watercourses or main rivers, from the lead local flood authorities, Natural Resources Wales, or the Environment Agency (**D-WR-045 of the REAC, Document reference:D.6.5.1**). • Any watercourses interrupted during excavation would be temporarily diverted or serviced with pumps to bypass the excavated section. Therefore, with these mitigation measures in place, no impact on existing levels of priority hazardous substances is foreseen at the WFD water body scale.
Hydromorphological		
Quantity and Dynamics of Water Flow	**Generic Impacts** Open cut crossings would disrupt the quantity and dynamics of flow during the Construction Stage due to the need to either temporarily divert the flows or over-pump. These impacts would be temporary in nature and the channel and flows reinstated post-construction.	**Generic Mitigation** The following mitigation procedures would be implemented to mitigate the potential impacts to the quantity and dynamics of flow: • Any watercourse interrupted during excavation would be temporarily, and only locally, diverted or serviced with pumps to bypass the excavated section. • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)**. • Vegetation reinstatement on open cut crossings would include riparian planting with enhancements to the riparian zone in line with the **Landscape and Ecology Management Plans (LEMP) (Document reference: D.6.5.5)** where practicable. • Where required and appropriate, bio-textile matting would be used to stabilise the banks of the watercourse whilst vegetation established post construction (**D-WR-029 of the REAC, Document reference: D.6.5.1**). • A minimal working width would be adopted as far as practicable to minimise the potential impacts of open cut crossings (**D-WR-049 of the REAC, Document reference: D.6.5.1)**. • The alignment of the Newbuild Carbon Dioxide Pipeline to be developed during Detailed Design would seek to minimise potential environmental impacts as far as practicable (**D-WR-050 of the REAC, Document reference: D.6.5.1)**. • Where practicable, any habitats that have been removed would be reinstated, such as riffles, pools, point bars, berms, large wood, log jams, cross-sectional and planform variation. Any reinstatement would be ensured not to cause other potential impacts, such as increase flood risk (**D-WR-051 of the REAC, Document reference: D.6.5.1)**. • **D-WR-045 of the REAC, Document reference: D.6.5.1** • **D-WR-047 of the REAC, Document reference: D.6.5.1** Therefore, no impact on the quantity and dynamics of flow is expected for this activity at the WFD water body scale.
	Site Specific Impacts *Backford Brook (Finchetts Gutter water body)*	**Site Specific Mitigation** *Backford Brook (Finchetts Gutter water body)* **D-WR-050 of the REAC, Document reference: D.6.5.1**

Quality Element	Potential Impact	Mitigation
	Large wood and fallen trees are characteristic of the Backford Brook upstream of the field boundary culvert location. This large wood habitat creates log jams and step-pools within the channel introducing flow-type diversity, pools, riffles and holding back flows locally. The removal of this large wood habitat would create a more uniform channel and remove this large wood habitat and associated in-channel morphological features that influence the quantity and dynamics of flow. Potential impacts could therefore occur during both the Construction and Operation Stage. *Finchetts Gutter (tributary) (Finchetts Gutter water body)* Finchetts Gutter tributary has a sinuous planform, riffles, pools, point bars and berm features which create a diversity of flow types within the reach. The open cut crossing could potentially remove these features and create a more uniform flow type diversity and planform within the open cut reach. Potential impacts would therefore occur during both the Construction and Operation Stage. *Alltami Brook (Wepre Brook water body)* The Alltami Brook has a sinuous planform with a bedrock channel and depositional gravel bar features. The planform and in-channel features create a variety of flow types within the potentially impacted reach. The open cut crossing would remove natural bedrock material and be reinstated with likely a mixture of artificial and natural material. The modifications would create an artificial bed and potentially alter the depositional processes operating which may alter the dynamics of flow and flow type diversity.	On Backford Brook, the potential to construct the Newbuild Carbon Dioxide Pipeline within the modified reach (which is of Poor River Condition) within the Newbuild Infrastructure Boundary would be explored so as to avoid disturbance to the upstream reach, which is of Fairly Good River Condition with good flow type diversity due to the log jams and step-pools. **D-WR-051 of the REAC, Document reference: D.6.5.1** The reinstatement of the large wood habitat, as outlined above, would be important to maintain the flow type diversity and river condition within this reach. Reinstatement of the riparian zone and riparian enhancement in line with the **LEMP (Document reference: D.6.5.5)** are also proposed to off-set impacts to Backford Brook. Therefore, no impact on quantity and dynamics of flow is foreseen at the WFD water body scale. *Finchetts Gutter (tributary) (Finchetts Gutter water body)* The following mitigation measures in the REAC, Document reference: D.6.5.1: • **D-WR-049** • **D-WR-050** • **D-WR-051** Reinstatement of the riparian zone and riparian enhancement in line with the **LEMP (Document reference: D.6.5.5)** are also proposed to off-set impacts to Finchetts Gutter tributary. Therefore, no impact on quantity and dynamics of flow is foreseen at the WFD water body scale. *Alltami Brook (Wepre Brook water body)* The following mitigation measures in the REAC, Document reference: D.6.5.1: • **D-WR-047** • **D-WR-063** • **D-WR-064** • **D-WR-065** Therefore, no impact on quantity and dynamics of flow is foreseen at the WFD water body scale.

Quality Element	Potential Impact	Mitigation
	Potential impacts would therefore occur during both the Construction and Operation Stage.	
River Continuity	**Generic Impacts** Open cut crossings would disrupt the river continuity during the Construction Stage due to the need to either temporarily divert the flows or over-pump. These impacts would be temporary in nature and the connectivity reinstated post-construction.	**Generic Mitigation** The following mitigation procedures would be implemented to mitigate the potential impacts to the river continuity: • Any watercourse interrupted during excavation would be temporarily, and only locally, diverted or serviced with pumps to bypass the excavated section. • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4**) • Vegetation reinstatement on open cut crossings would include riparian planting with enhancements to the riparian zone in line with the **LEMP (Document reference: D.6.5.5)** where practicable. As well as the following mitigation measures in the REAC, Document reference: D.6.5.1: • **D-WR-045** • **D-WR-047** • **D-WR-049** • **D-WR-050** • **D-WR-051** Therefore, no impact to river continuity is expected for this activity at the WFD water body scale.
	Site Specific Impacts *Backford Brook (Finchetts Gutter water body)* The natural river continuity along the upstream reach of the Backford Brook within the Newbuild infrastructure Boundary is disrupted by fallen mature trees, large wood on both the banks and in the channel and by log jams that create step-pool sequences. The removal of this large wood habitat would create a more uniform channel and uninterrupted river continuity and associated in-channel morphological features. Potential impacts would therefore occur during both the Construction and Operation Stage. *Finchetts Gutter (tributary) (Finchetts Gutter water body)* Finchetts Gutter tributary has a sinuous planform, riffles, pools, point bars and berm features which	**Site Specific Mitigation** *Backford Brook (Finchetts Gutter water body)* **D-WR-050 and D-WR-051 of the REAC, Document reference:D.6.5.1** On Backford Brook, the potential to construct the Newbuild Carbon Dioxide Pipeline within the modified reach (which is of Poor River Condition) within the Newbuild Infrastructure Boundary would be explored so as to avoid disturbance to the upstream reach, which is of Fairly Good River Condition. The reinstatement of the large wood habitat, as outlined above, would be important to maintain the river condition within this reach. Therefore, no impact to river continuity is expected for this activity at the WFD water body scale. *Finchetts Gutter (tributary) (Finchetts Gutter water body)* **D-WR-051 of the REAC, Document reference:D.6.5.1**

Quality Element	Potential Impact	Mitigation
	create a diversity of flow types within the reach. The open cut crossing could potentially remove these features and create a more uniform and straightened planform within the absence of in-channel morphological features that could alter the baseline river continuity. Potential impacts would therefore occur during both the Construction and Operation Stage. *Alltami Brook (Wepre Brook WFD water body)* The Alltami Brook would be temporarily diverted or serviced with pumps to bypass the excavated section through the working width of the open cut crossing. This may have a short term adverse impact on sediment transport. The open cut crossing would remove natural bedrock material and be reinstated with likely a mixture of artificial and natural material. The modifications would create an artificial bed and potentially alter the depositional processes operating which can affect river continuity. The change in riverbed structure could also adversely impact continuity of bed material and aquatic habitat.	The reinstatement of the large wood habitat, as outlined above, would be important to maintain the river condition within this reach. Therefore, no impact to river continuity is expected for this activity at the WFD water body scale. *Alltami Brook (Wepre Brook WFD water body)* The following mitigation measures in the REAC, Document reference: D.6.5.1: • **D-WR-063** • **D-WR-064** • **D-WR-065** Therefore, no impact to river continuity is expected for this activity at the WFD water body scale.

River Depth and Width Variation	**Generic Impacts**
	Open cut crossings and channel reinstatement works can result in engineered bed and bank profiles, thus altering the existing river depth and width variation.
	Open cut crossings may also introduce fine sediment into the channel during the construction process. This fine sediment would settle on the watercourse bed and potentially alter bedforms and the river depth and width variation.
	Potential impacts would therefore occur during both the Construction and Operation Stage.
		Generic Mitigation
		The following mitigation procedures would be implemented to mitigate the potential impacts to river depth and width variation:
		• Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)**.
		• Vegetation reinstatement on open cut crossings would include riparian planting with enhancements to the riparian zone in line with **LEMP (Document reference: D.6.5.5)** where practicable.
		• As well as the following measures in the **REAC (Document reference: D.6.5.1).**
		  • **D-WR-045**
		  • **D-WR-046**
		  • **D-WR-047**
		  • **D-WR-049**
		  • **D-WR-050**
		  • **D-WR-051**

Quality Element	Potential Impact	Mitigation
	Site Specific Impacts *Backford Brook (Finchetts Gutter water body)* Open cut crossing on Backford Brook has the potential to remove complex large wood and trees habitat both within the riparian zone and in-channel as part of the enabling works and construction activities. Large wood presently forms complex in-channel habitat diversity in the form of log jams and step-pools. The loss of these habitat features would result in deterioration in river width and depth variation at a localised scale. Potential impacts would therefore occur during both the Construction and Operation Stage. *Friars Park Ditch (Finchetts Gutter water body)* Open cut crossing on Friars Park Ditch would remove mature vegetation and large wood/tree habitat as part of the enabling works and construction activities. The removal of these features would result in deterioration in river width and depth variation at a localised scale. Potential impacts would therefore occur during both the Construction and Operation Stage. *Finchetts Gutter tributary (Finchetts Gutter water body)* Open cut on the Finchetts Gutter Tributary would remove natural bank profiles, complex and mature riparian vegetation on the bank faces, and remove habitat features such as pools and point bars that were observed within a sinuous channel as part of the enabling works and construction activities. Potential impacts would therefore occur	Therefore, no impact on existing river depth and width variation is foreseen at the WFD water body scale. **Site Specific Mitigation** *Backford Brook, Friars Park Ditch and Finchetts Gutter tributary (Finchetts Gutter water body)* Channel and bank reinstatement as well as habitat reinstatement will be key within this water body, as outlined above. The following additional mitigation procedures would be implemented to mitigate the potential impacts to river depth and width variation within the Finchetts Gutter WFD water body: • Turbidity monitoring to be undertaken by an ECoW during the Construction Stage where deemed required due to the sensitivity of aquatic species receptors. The need and frequency of turbidity monitoring would be determined by the regulatory authority and detailed in any required permits for undertaking work within or near watercourses. Turbidity monitoring would aid the control of fine sediment input to the watercourse to mitigate the risk of altering bedforms and depositional features (**D-WR-044 of the REAC, Document reference: D.6.5.1**). Therefore, no impact on existing river depth and width variation is foreseen at the WFD water body scale. *Alltami Brook (Wepre Brook WFD water body)*

Quality Element	Potential Impact	Mitigation
	during both the Construction and Operation Stage. *Alltami Brook (Wepre Brook WFD water body)* Open cut crossing is expected to occur along a bedrock channel section of the Alltami Brook (Wepre Brook WFD water body), thus, permanently altering the original depth and width variation in conjunction with the original substrate (roughness) of the riverbed. In addition, open cutting through bedrock is likely to introduce fine dust and additional sediment load to the Alltami Brook. Potential impacts would therefore occur during both the Construction and Operation Stage.	The following mitigation measures in the REAC, Document reference: D.6.5.1: • **D-WR-044** • **D-WR-063** • **D-WR-064** • **D-WR-065** Therefore, no impact on existing river depth and width variation is foreseen at the WFD water body scale.
Structure and Substrate of the River Bed	**Generic Impacts** Open cut crossings and channel reinstatement works can result in alteration to the structure and substrate of the riverbed and introduce new materials to the channel. Open cut crossings could also disrupt the baseline sediment regime within the channel and affect the sediment transport and depositional features. Open cut crossings may also introduce fine sediment into the channel during the construction process. This fine sediment would settle on the watercourse bed and potentially alter bedforms and the structure and substrate of the riverbed. Following construction, the riverbed would be reinstated. Potential impacts would therefore occur during both the Construction and Operation Stage. **Site Specific Impacts** *Backford Brook (Finchetts Gutter water body)*	**Generic Mitigation** The following mitigation procedures would be implemented to reinstate the structure and substrate of the river bed: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)**. As well as the following measures in the **REAC (Document reference: D.6.5.1).** • **D-WR-045** • **D-WR-046** • **D-WR-047** • **D-WR-049** • **D-WR-050** • **D-WR-051** Therefore, by applying those mitigation measures, no impact on existing riverbed structure and substrate is foreseen at the WFD water body scale. **Site Specific Mitigation** *Backford Brook, Friars Park Ditch and Finchetts Gutter tributary (Finchetts Gutter water body)*

Quality Element	Potential Impact	Mitigation
	Open cut crossing on Backford Brook has the potential to remove complex large wood and trees habitat both within the riparian zone and in-channel as part of the enabling works and construction activities. Large wood presently forms complex in-channel habitat diversity in the form of log jams and step-pools and influences the structure and substrate of the riverbed. The loss of these habitat features would alter the sediment dynamics operating within the reach, which could change the structure and substrate of the riverbed. Potential impacts would therefore occur during both the Construction and Operation Stage. *Finchetts Gutter tributary (Finchetts Gutter water body)* This watercourse has a sinuous planform, gravel substrate, pools and depositional bar features. Open cut on the Finchetts Gutter Tributary would remove these features during the Construction Stage which could potentially alter the structure and substrate of the riverbed at the reach-scale. Potential impacts would therefore occur during both the Construction and Operation Stage. *Alltami Brook (Wepre Brook WFD water body)* Open cut crossing is expected to occur along a bedrock channel section of the Alltami Brook (Wepre Brook WFD water body), thus, permanently altering the original structure (morphology) and substrate (grain size roughness) of the riverbed. This would require the permanent removal of a section of bedrock substrate for the open cut trench required to install the pipeline. The channel bed would be reinstated using concrete thus permanently altering the structure and substrate of the river	Channel and bank reinstatement as well as habitat reinstatement will be key within this water body, as outlined above. Also **D-WR-044 of the REAC, Document reference: D.6.5.1** will be implemented to mitigate potential impacts to the Finchetts Gutter WFD water body: Therefore, by applying these mitigation measures, no significant impact on existing riverbed structure and substrate is foreseen at the Finchetts Gutter WFD water body catchment scale. *Alltami Brook (Wepre Brook WFD water body)* The following mitigation measures in the **REAC, Document reference: D.6.5.1**: • **D-WR-063** • **D-WR-064** • **D-WR-065** With the impacts to the structure and substrate of the riverbed being localised, no significant impact is anticipated at the Wepre Brook WFD water body scale.

Quality Element	Potential Impact	Mitigation
	bed within the impacted reach of the Alltami Brook. The removal of natural bedrock substrate and permanent replacement with a likely mix of artificial and natural materials would have a localised impact on the structure and substrate of the Alltami Brook riverbed during both construction and operation.	
Structure of the Riparian Zone	**Generic Impacts** Open cut crossings and channel reinstatement works can result in alteration to the structure of the riparian zone due to the need to remove vegetation along a potential 32m wide strip along the construction zone. This would remove riparian vegetation on the bank face, bank top and floodplain. A tree exclusion zone of approximately 10m either side of the Newbuild Carbon Dioxide Pipeline would be imposed during operation, therefore lost trees lining the watercourse and riparian zone would not be replaced within this zone. This would result in a permanent alteration to the structure of the riparian zone at a localised level. Potential impacts would therefore occur during both the Construction and Operation Stage.	**Generic Mitigation** The following mitigation procedures would be implemented to reinstate the structure of the riparian zone: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)**. • Vegetation reinstatement on open cut crossings would include riparian planting with enhancements to the riparian zone in line with **LEMP (Document reference: D.6.5.5)** where practicable. As well as the following measures in the **REAC (Document reference: D.6.5.1).** • **D-WR-045** • **D-WR-046** • **D-WR-047** • **D-WR-049** • **D-WR-050** • **D-WR-051** Therefore, impacts on the structure of the riparian zone would be kept to a minimum and localised with no adverse impacts anticipated at the WFD water body scale. **Site Specific Mitigation** *Backford Brook, Friars Park Ditch and Finchetts Gutter tributary (Finchetts Gutter water body)* The following additional mitigation procedures would be implemented to reinstate the structure of the riparian zone within the Finchetts Gutter WFD water body: **D-WR-050 of the REAC, Document reference:D.6.5.1.** On Backford Brook, the potential to construct the Newbuild Carbon Dioxide Pipeline within the modified reach (which is of Poor River Condition) within the Newbuild Infrastructure Boundary would be explored so as to avoid disturbance to the upstream reach, which is of Fairly Good River Condition. The reinstatement of the large wood habitat, as outlined above, would be important to maintain the river condition within this reach. • Riparian planting along Friars Park Ditch, Backford Brook and Finchetts Gutter Tributary, which is additional to the vegetation which would be reinstated from open cut crossings. This should be a mix of riparian trees and shrub species where practicable (**D-WR-062 of the REAC, Document reference:D.6.5.1**).

	Site Specific Impacts *Backford Brook (Finchetts Gutter water body)* Open cut crossing on Backford Brook has the potential to remove complex large wood and trees habitat both within the riparian zone and in-channel as part of the enabling works and construction activities. Large wood presently forms complex in-channel habitat diversity in the form of log jams and step-pools. The loss of these habitat features would result in deterioration in riparian vegetation at a localised scale. Potential impacts would therefore occur during both the Construction and Operation Stage. *Friars Park Ditch (Finchetts Gutter water body)* Open cut crossing on Friars Park Ditch will remove mature vegetation and large wood/tree habitat as part of the enabling works and construction activities. The removal of these features will result in deterioration in riparian vegetation at a localised scale. Potential impacts would therefore occur during both the Construction and Operation Stage. *Finchetts Gutter tributary (Finchetts Gutter water body)* Open cut on the Finchetts Gutter Tributary would remove natural bank profiles, and complex and mature riparian vegetation on the bank faces as part of the enabling works and construction activities. Potential impacts would therefore occur during both the Construction and Operation Stage. *Alltami Brook (Wepre Brook WFD water body)* Open cut crossing on Alltami Brook has the potential to remove complex large wood and tree habitat both within the riparian zone and in-	Therefore, by applying those mitigation measures, no significant impact on existing riparian vegetation is foreseen for the watercourses within the Finchetts Gutter WFD water body at the WFD water body scale. *Alltami Brook (Wepre Brook WFD water body)* **D-WR-063 and D-WR-047** of the **REAC, Document reference:D.6.5.1** Therefore, by applying those mitigation measures, no significant impact on existing riparian vegetation structure is foreseen for the watercourses within the Wepre Brook WFD water body at the water body scale.

Quality Element	Potential Impact	Mitigation
	channel as part of the enabling works and construction activities. Potential impacts would therefore occur during both the Construction and Operation Stage.	
<u>Transitional</u> ***Relevant water bodies: Dee (N.Wales)***		
<u>Physico-Chemical</u>		
Transparency	**Generic Impacts** Open cut crossings can potentially release fine sediments into suspension, hence, altering existing water colour (transparency) of the surface waters in this transitional water body. These impacts would be temporary in nature and only during the Construction Stage.	**Generic Mitigation** The following mitigation procedures would be implemented to manage potential impacts on transparency: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)** to reduce entrainment of loose material. • Clearance of vegetation on the channel banks, valley sides and riparian zone would be limited to the minimum practicable. A minimum of 8m vegetated buffer strip between the construction zone and the watercourse would be retained, wherever practicable. (**D-WR-027** of the **REAC, Document reference: D.6.5.1**) • Where works are required on the watercourse banks, or in-channel, vegetation clearance will be restricted to the minimum required for the construction working area and should be undertaken only immediately prior to the commencement of those works, except for other circumstances where earlier clearance may be required due to the presence of protected species. Vegetation should be re-established as soon as practicable. If necessary, and where practicable, additional measures such as geotextiles (biodegradable and non-biodegradable), willow whips, mulching, brushwood mattresses etc. will be used to protect soils before vegetation has re-established, particularly on the watercourse banks (**D-WR-028** of the **REAC, Document reference: D.6.5.1**). • Where practicable, construction works will avoid works on watercourses during high flow events to reduce the risk of fine sediment release. The Detailed Design construction programme will seek to target the construction activities involving watercourses for the drier summer months to reduce this risk, whilst taking into account the window for construction activities in relation to aquatic ecology and, in particular, the fish migratory season (**D-WR-030** of the **REAC, Document reference: D.6.5.1**). • **D-WR-029 and D-WR-045** of the **REAC, Document reference: D.6.5.1** Therefore, as these works are relatively smaller than the water body size, no impact on existing water colour (transparency) is foreseen at the WFD water body scale.
Thermal Conditions	**Generic Impacts** Open cut crossings can potentially reduce the longitudinal connectivity through impoundment, hence, altering local thermal conditions of the surface watercourses within the wider transitional water body.	**Generic Mitigation** The following mitigation procedures would be implemented to manage potential impacts on thermal conditions: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)**. • **D-WR-030 and D-WR-045** of the **REAC, Document reference: D.6.5.1** Therefore, no impact on thermal conditions is expected for this activity at the WFD water body scale.

Quality Element	Potential Impact	Mitigation
	Any watercourse interrupted during excavation would be temporarily diverted or serviced with pumps to bypass the excavated section. These impacts would be temporary in nature and only during the Construction Stage.	
Priority Hazardous Substances	**Generic Impacts** Open cut crossings can potentially disrupt the alluvial sediments underneath the watercourses, hence, releasing hazardous substances to the ground and surface water flow. These impacts would be temporary in nature and only during the Construction Stage.	**Generic Mitigation** The following mitigation procedures would be implemented to manage potential impacts from hazardous substances: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)**. • **D-WR-030 and D-WR-045** of the **REAC, Document reference: D.6.5.1** Therefore, no impact on existing levels of priority hazardous substances is foreseen at the WFD water body scale.
Hydromorphological		
Quality, Structure and Substrate of the bed	**Generic Impacts** Open cut crossings can potentially alter existing riverbed of open channels within this transitional water body and, therefore, its structure and substrate. Potential impacts would therefore occur during both the Construction and Operation Stage.	**Generic Mitigation** The following mitigation procedures would be implemented to manage the risk to the quality, structure and substrate of the riverbed: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)**to reduce entrainment of loose material. • **D-WR-027** • **D-WR-028** • **D-WR-030** • **D-WR-029** • **D-WR-045** • **D-WR-047** Therefore, by applying those mitigation measures, no impact on existing quality, structure and substrate of the river bed is foreseen at the WFD water body scale.

RIPARIAN VEGETATION CLEARANCE

Table 5.4: Impact on the WFD Quality elements from riparian vegetation clearance on relevant water bodies

Quality Element	Potential Impact	Mitigation
Relevant water bodies: *Mersey, Ince Marshes, Gowy, Stanney Mill Brook, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook, and Dee (N.Wales)*		
Surface water and Transitional/Coastal		
Biological		
Macrophytes & Phytoplankton	**Generic Impacts** Riparian vegetation clearance can potentially alter the physico-chemical and hydromorphological conditions of affected watercourses, which can negatively impact the quality and availability of macrophyte and phytoplankton habitat. These impacts would occur during the enabling works and Construction Stage but the effects would diminish during the Operation Stage as vegetation re-establishes. Only watercourses within the Ince Marshes, Gowy, Finchetts Gutter and Dee (N.Wales) water bodies are potentially impacted.	**Generic Mitigation** The following mitigation procedures would be implemented to manage the risk to macrophytes and phytoplankton: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)**to reduce entrainment of loose material. • **D-WR-027, D-WR-028 and D-WR-029 of the REAC, Document reference: D.6.5.1** • Silt control measures, such as silt fences, would be installed near the construction site (**D-WR-004 of the REAC, Document reference: D.6.5.1**) • Biosecurity measures, such as the “Check, Clean, Dry” principles, are to be implemented to prevent INNS establishment (**D-BD-042 of the REAC, Document reference: D.6.5.1**). Therefore, given the localised nature of this activity and implementation of mitigation measures, the impact of riparian vegetation clearance is expected to be negligible for the scale of affected water bodies.
Invertebrates	**Generic Impacts** Riparian vegetation clearance can potentially alter the physico-chemical and hydromorphological conditions of affected watercourses, which can negatively impact the quality and availability of invertebrate habitat. These impacts would occur during the enabling works and Construction Stage, but the effects would diminish during the Operation Stage as vegetation re-establishes.	**Generic Mitigation** The following mitigation procedures would be implemented to mitigate the impact on invertebrates: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)**to reduce entrainment of loose material. • **D-WR-004, D-WR-027, D-WR-028, D-WR-029 D-BD-042 of the REAC, Document reference: D.6.5.1** Therefore, given the localised nature of this activity and implementation of mitigation measures, the impact of riparian vegetation clearance is expected to be negligible for the scale of affected water bodies.

Quality Element	Potential Impact	Mitigation
Fish	**Generic Impacts** Riparian vegetation clearance can potentially alter the physico-chemical and hydromorphological conditions of affected watercourses, which can negatively impact the quality and availability of fish habitat. These impacts would occur during the enabling works and Construction Stage but the effects would diminish during the Operation Stage as vegetation re-establishes.	**Generic Mitigation** The following mitigation procedures are to be implemented to mitigate the impact on fish: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)**to reduce entrainment of loose material. • **D-WR-004, D-WR-027, D-WR-028 and D-WR-029 and D-BD-042 of the REAC, Document reference: D.6.5.1** Therefore, given the localised nature of this activity and implementation of mitigation measures, the impact of riparian vegetation clearance is expected to be negligible for the scale of affected water bodies.
<u>Surface water</u> ***Relevant water bodies:*** ***Mersey, Hoolpool Gutter, Gowy, Stanney Mill Brook, Finchetts Gutter, Garden City Drain, Sandycroft Drain, Wepre Brook***		
<u>Physico-Chemical</u>		
Thermal Conditions	**Generic Impacts** Riparian vegetation clearance can potentially alter local temperature of open watercourses due to shadow reduction and increased sun exposure. These impacts would occur during the enabling works and Construction Stage, but the effects would diminish during the Operation Stage as vegetation re-establishes.	**Generic Mitigation** Riparian vegetation clearance would be restricted to the immediate facilities and sections required for construction purposes. Hence, given the localised nature of this activity and the much larger area of the water bodies, the impact of riparian vegetation clearance is expected to be negligible for the scale of affected water bodies.
Oxygenation Conditions	**Generic Impacts** Riparian vegetation clearance can potentially release fine sediments into suspension due to overland flow, hence, altering existing oxygenation condition. These impacts would occur during the enabling works and Construction Stage, but the effects would	**Generic Mitigation** Riparian vegetation clearance would be restricted to the immediate facilities and sections required for construction purposes. In addition, silt control measures such as silt fences would be installed near the construction site where vegetation clearance works have been conducted. Hence, given the localised nature of this activity and the much larger area of the water bodies, the impact of riparian vegetation clearance is expected to be negligible for the scale of affected water bodies.

Quality Element	Potential Impact	Mitigation
	diminish during the Operation Stage as vegetation re-establishes.	
Nutrient Conditions	**Generic Impacts** Riparian vegetation clearance can potentially release fine sediments into suspension due to overland flow, hence, altering existing nutrient condition. These impacts would occur during the enabling works and Construction Stage, but the effects would diminish during the Operation Stage as vegetation re-establishes.	**Generic Mitigation** Riparian vegetation clearance would be restricted to the immediate facilities and sections required for construction purposes. In addition, silt control measures such as silt fences would be installed near the construction site where vegetation clearance works have been conducted. Hence, given the localised nature of this activity and the much larger area of the water bodies, the impact of riparian vegetation clearance is expected to be negligible for the scale of affected water bodies.
Hydromorphological		
Quantity and Dynamics of Water Flow	**Generic Impacts** Riparian vegetation clearance can increase overland flow, hence, contributing to higher flow peaks and varying quantity and dynamics of flow. These impacts would occur during the enabling works and Construction Stage, but the effects would diminish during the Operation Stage as vegetation re-establishes.	**Generic Mitigation** The following mitigation procedures would be implemented to mitigate the impact of riparian vegetation clearance on the quantity and dynamics of water flow: Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4**) to reduce entrainment of loose material. As well as the following measures from the **REAC, Document reference: D.6.5.1** • **D-WR-004** • **D-WR-027** • **D-WR-028** • **D-WR-029** • **D-WR-047** • **D-WR-049** • **D-WR-050** • **D-WR-051** With the reinstatement of riparian vegetation structure and associated features post construction, the riparian vegetation clearance would not impact the quantity and dynamics of water flow during the Operational Stage once the vegetation and its structure had established. Therefore, no impacts are anticipated at the water body scale.
	Site Specific Impacts *Backford Brook (Finchetts Gutter water body)*	**Site Specific Mitigation** *Finchetts Gutter water body* The reinstatement of channel, banks and riparian habitat as described in the generic mitigation above would mitigate for the site specific impacts as well as **D-WR-062 of the REAC, Document reference: D.6.5.1.**

Quality Element	Potential Impact	Mitigation
	Riparian vegetation clearance on Backford Brook has the potential to remove complex large wood and fallen trees and mature trees both within the riparian zone and in-channel as part of the enabling works and construction activities. Large wood presently forms complex in-channel habitat diversity in the form of log jams and step-pools. Clearance of riparian vegetation would therefore alter the water flow dynamics within the reach. Potential impacts would therefore occur during both the Construction and Operation Stage. *Friars Park Ditch (Finchetts Gutter water body)* Riparian vegetation clearance on Friars Park Ditch would remove mature vegetation and large wood/tree habitat as part of the enabling works and construction activities. The removal riparian vegetation has the potential to alter water flow dynamics due to the removal of large wood from the channel and banks. Potential impacts would therefore occur during both the Construction and Operation Stage. *Alltami Brook (Wepre Brook WFD water body)* Riparian vegetation clearance on Alltami Brook has the potential to remove complex large wood and	With the reinstatement of riparian vegetation and its structure, no impacts are anticipated to the quantity and dynamics of water flow at the water body scale. *Alltami Brook (Wepre Brook water body)* **D-WR-063** and **D-WR-047** of the **REAC, Document reference: D.6.5.1**. With the reinstatement of riparian vegetation and its structure, no impacts are anticipated to the quantity and dynamics of water flow at the water body scale.

Quality Element	Potential Impact	Mitigation
	trees habitat both within the riparian zone and in-channel as part of the enabling works and construction activities. This could alter the dynamics of water flow during the enabling works and Construction Stage. Potential impacts would therefore occur during both the construction and Operation Stage.	
Structure and Substrate of the Riverbed	**Generic Impacts** Riparian vegetation clearance can potentially release fine sediments into suspension due to overland flow, hence, altering existing structure and substrate of the riverbed. These impacts would occur during the enabling works and Construction Stage, but the effects would diminish during the Operation Stage as vegetation re-establishes. **Site Specific Impacts** *Backford Brook (Finchetts Gutter water body)* Riparian vegetation clearance on Backford Brook has the potential to remove complex large wood and fallen trees and mature trees both within the riparian zone and in-channel as part of the enabling	**Generic Mitigation** The following mitigation procedures would be implemented to mitigate the impact of riparian vegetation clearance on the structure and substrate of the riverbed: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)**to reduce entrainment of loose material. As well as the following measures from the **REAC, Document reference: D.6.5.1** • **D-WR-004** • **D-WR-027** • **D-WR-028** • **D-WR-029** • **D-WR-047** • **D-WR-049** • **D-WR-050** • **D-WR-051** With the reinstatement of riparian vegetation structure and associated features post construction, the riparian vegetation clearance would not impact the structure and substrate of the riverbed during the Operational Stage once the vegetation and its structure had established. Therefore, no impacts are anticipated at the water body scale. **Site Specific Mitigation** *Finchetts Gutter water body* The reinstatement of channel, banks and riparian habitat as described in the generic mitigation above would mitigate for the site specific impacts. With the reinstatement of riparian vegetation and its structure, no impacts are anticipated to the quantity and dynamics of water flow at the water body scale.

Quality Element	Potential Impact	Mitigation
	works and construction activities. Large wood presently forms complex in-channel habitat diversity in the form of log jams and step-pools which in turn influences the structure and substrate of the riverbed. In addition, if the habitat is not recreated to mimic baseline post construction, the loss of large wood would increase flow velocity, which could result in increased sediment transport through the reach, which could have wider impacts on the structure and substrate of the reach. These impacts would unlikely extend to the water body scale.	
Structure of the Riparian Zone	**Generic Impacts** Riparian vegetation clearance can negatively impact the structure of the riparian zone. These impacts would occur during the enabling works and Construction Stage but the effects would diminish during the Operation Stage as vegetation re-establishes. **Site Specific Impacts** *Backford Brook (Finchetts Gutter water body)* Riparian vegetation clearance on Backford Brook has the potential to remove complex large wood and	**Generic Mitigation** The following mitigation procedures would be implemented to mitigate the impact of riparian vegetation clearance on the structure of the riparian zone: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)**to reduce entrainment of loose material. As well as the following measures from the **REAC, Document reference: D.6.5.1** • **D-WR-004** • **D-WR-027** • **D-WR-028** • **D-WR-029** • **D-WR-047** • **D-WR-049** • **D-WR-050** • **D-WR-051** With the reinstatement of riparian vegetation structure and associated features post construction, the riparian vegetation clearance would not impact the riparian zone structure during the Operational Stage once the vegetation and its structure has established. Therefore, no impacts are anticipated at the water body scale. **Site Specific Mitigation** *Finchetts Gutter water body* The reinstatement of channel, banks and riparian habitat as described in the generic mitigation above would mitigate for the site specific impacts.

Quality Element	Potential Impact	Mitigation
	trees habitat both within the riparian zone and in-channel as part of the enabling works and construction activities. Large wood presently forms complex in-channel habitat diversity in the form of log jams and step-pools. The loss of these habitat features would result in deterioration in riparian vegetation at a localised scale. The riparian vegetation clearance would also require the felling of mature trees. *Friars Park Ditch (Finchetts Gutter water body)* Riparian vegetation clearance on Friars Park Ditch would remove mature trees and associated tree features including large wood habitat as part of the enabling works and construction activities. The removal of these features would result in deterioration in riparian vegetation at a localised scale. *Finchetts Gutter (Finchetts Gutter water body)* Riparian vegetation clearance on the Finchetts Gutter Tributary would remove complex and mature trees and riparian vegetation on the bank faces as part of the enabling works and construction activities. *Alltami Brook (Wepre Brook water body)* Riparian vegetation clearance on Alltami Brook has the potential to remove mature trees and complex	With the reinstatement of riparian vegetation and its structure, no impacts are anticipated to the quantity and dynamics of water flow at the water body scale. *Alltami Brook (Wepre Brook water body)* **D-WR-047 and D-WR-063 of the REAC, Document reference: D.6.5.1.**

Quality Element	Potential Impact	Mitigation
	large wood habitat both within the riparian zone as part of the enabling works and construction activities.	Therefore, by applying those mitigation measures, no significant impact on the riparian zone is foreseen for the watercourses within the Wepre Brook WFD water body at the water body scale as a result of riparian vegetation clearance.
Transitional: **Dee(N.Wales)**		
Hydromorphological		
Quality, Structure and Substrate of the bed	**Generic Impacts** Riparian vegetation clearance can potentially release fine sediments into suspension due to overland flow, hence, altering existing structure and substrate of the riverbed. These impacts would occur during the enabling works and Construction Stage, but the effects would diminish during the Operation Stage as vegetation re-establishes.	**Generic Mitigation** The following mitigation procedures would be implemented to mitigate the impact of riparian vegetation clearance on the structure of the riparian zone: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)**to reduce entrainment of loose material. As well as the following measures from the **REAC, Document reference: D.6.5.1** • **D-WR-004** • **D-WR-027** • **D-WR-028** • **D-WR-029** • **D-WR-047** • **D-WR-049** • **D-WR-050** • **D-WR-051** With the reinstatement of riparian vegetation structure and associated features post construction, the riparian vegetation clearance would not impact the riparian zone structure during the Operational Stage once the vegetation and its structure has established. Therefore, no impacts are anticipated at the water body scale.

TEMPORARY WATERCOURSE CROSSING

Table 5.5: Impact on the WFD Quality elements from temporary watercourse crossing on relevant water bodies

Quality Element	Potential Impact	Mitigation
Relevant water bodies: Ince Marshes, Gowy, Stanney Mill Brook, Finchetts Gutter, Garden City Drain, Wepre Brook, and Dee (N. Wales)		
Surface water and Transitional/Coastal		
Biological		
Macrophytes & Phytoplankton	**Generic Impact** Temporary crossings can increase shading extent and alter the hydromorphological and physico-chemical conditions of affected watercourses, which can potentially result in the loss or damage of macrophytes and phytoplankton and their habitats during the Construction Stage.	**Generic Mitigation** Baseline macrophyte diversity was poor across the impacted water bodies, characterised by common, non-protected species that are well established within the vicinity of the proposed Newbuild Infrastructure Boundary. Therefore, natural recovery and re-establishment is anticipated once construction is complete. Nevertheless, procedures are to be implemented to mitigate the impacts. The crossings would be above the bankfull stage, so no major alterations to the hydromorphology (and consequently physico-chemical conditions) of the watercourses is expected to occur under normal flow conditions. Additionally, crossings would be temporary and limited to short, and essential, sections where construction works are required. Sediment control techniques such as use of silt fences, and post-construction replanting would also be implemented if needed. Therefore, given the localised nature of this activity and the much larger area of the water bodies, the impact of temporary watercourse crossing is expected to be localised and of negligible impact at the water body scale.
Invertebrate	**Generic Impact** Temporary crossings can alter the hydromorphological and physico-chemical conditions of the affected watercourses, which can potentially result in the loss or damage of invertebrates and their habitats during the Construction Stage.	**Generic Mitigation** The crossings would be above the bankfull stage, so no major alterations to the hydromorphology (and consequently physico-chemical conditions) of the watercourses is expected to occur under normal flow conditions. Additionally, crossings would be temporary and limited to short, and essential, sections where construction works are required. Sediment control techniques such as use of silt fences, and post-construction replanting would also be implemented if needed. Therefore, given the localised nature of this activity and the much larger area of the water bodies, the impact of temporary watercourse crossing is expected to be localised and of negligible impact at the water body scale.
Fish	**Generic Impact** Temporary crossings can alter the hydromorphological and physico-chemical conditions of the affected watercourses, which can potentially result in the loss or damage of fish and their habitats. Temporary watercourse crossing can create an impoundment and, therefore, impact fish passage. These impacts would be limited to the Construction Stage.	**Generic Mitigation** The crossings would be above the bankfull stage, so no major alterations to the hydromorphology (and consequently physico-chemical conditions) of the watercourses is expected to occur under normal flow conditions, and therefore fish passage would be unaffected. Additionally, crossings would be temporary and limited to short, and essential, sections where construction works are required. Sediment control techniques such as use of silt fences (**D-WR-004 of the REAC, Document reference: D.6.5.1**), and post-construction replanting would also be implemented if needed (**D-WR-047 of the REAC, Document reference: D.6.5.1**). Therefore, given the localised nature of this activity and the much larger area of the water bodies, the impact of temporary watercourse crossing is expected to be localised and of negligible impact at the water body scale. Where necessary and practicable, the installation of temporary culverts and causeways/access routes within watercourses will avoid sensitive fish migration and spawning periods: • 1 October to 31 April - European eel, lamprey and salmonids. • 15 March to 15 June - Coarse fish.

Quality Element	Potential Impact	Mitigation
		The requirement for such structures would be determined during the detailed design stage of the DCO Proposed Development. Where unable to be accommodated outwith fish migration and spawning periods, liaison with NRW/EA will be required with applications for exemptions sought. (**D-BD-050 of the REAC, Document reference: D.6.5.1**) Temporary culverts required on main watercourses (i.e. not field ditches) will be suitability sized and designed/installed to Environment Agency Fish Pass standards (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/298053/geho0910btbp-e-e.pdf) to facilitate passage of eel, lamprey, salmonids and coarse fish species. (**D-BD-051 of the REAC, Document reference: D.6.5.1**) The Construction Contractor will remove culverts and temporary causeways/access routes as soon as reasonably practicable following completion of the works (**D-WR-048 of the REAC, Document reference:D.6.5.1**).
Surface water		
Physico-Chemical		
Thermal Conditions	**Generic Impact** Temporary watercourse crossings can increase shadow extent in the water body, therefore, altering local thermal conditions. On watercourses with no perceptible flow, this could lead to a localised cooling effect of the water. These impacts would be limited to the Construction Stage.	**Generic Mitigation** The crossings would be temporary and limited to short, and essential, sections where construction works are required. Hence, given the localised nature of this activity and the much larger area of the water bodies, the impact of temporary watercourse crossing is expected to be of negligible impact at the water body scale.
Oxygenation Conditions	**Generic Impact** Temporary watercourse crossing can create an impoundment and, therefore, impact existing oxygenation conditions during the Construction Stage.	**Generic Mitigation** The crossings would be above the bankfull stage, so no impoundment is expected to occur under normal flow conditions. Hence, the impact of temporary watercourse crossing is expected to be of negligible impact at the water body scale.
Priority Hazardous Substances	**Generic Impact** Temporary watercourse crossings can release priority hazardous substances during the Construction Stage. These impacts would be limited to the Construction Stage.	**Generic Mitigation** Temporary watercourse crossing installation would follow all necessary sediment control techniques such as use of silt fences, and post-construction replanting if needed. Hence, in addition to the localised nature of this activity and the much larger area of the water bodies, the impact of temporary watercourse crossing on the release of priority hazardous substances is expected to be of negligible impact at the water body scale.

Quality Element	Potential Impact	Mitigation
Hydromorphological		
Quantity and Dynamics of Water Flow	**Generic Impact** Temporary watercourse crossings can cause impoundment during out of bank flows, hence, impacting the quantity and dynamics of flow. These impacts would be limited to the Construction Stage.	**Generic Mitigation** Any potential impact of the temporary watercourse crossings would be restricted to out of bank flows, which have a relatively low occurrence. In addition, overtopping is likely to occur for flood flows, which would allow free-flowing-like conditions, further minimising potential impacts of the temporary crossings. The following mitigation procedures would be implemented to mitigate the impact of riparian vegetation clearance on the structure of the riparian zone: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)** to reduce entrainment of loose material. As well as the following measures in the **REAC, Document reference: D.6.5.1:** • **D-WR-027** • **D-WR-028** • **D-WR-029** • **D-WR-045** • **D-WR-047** • **D-WR-048** • **D-WR-049** • **D-WR-050** • **D-WR-051** Therefore, the impact of temporary watercourse crossings on the quantity and dynamics of water flow is expected to be of negligible impact at the water body scale.
River Continuity	**Generic Impact** Temporary watercourse crossings can cause impoundment during out of bank flows, hence, impacting river continuity. These impacts would be limited to the Construction Stage.	**Generic Mitigation** Any potential impact of the temporary watercourse crossings would be restricted to out of bank flows, which have a relatively low occurrence. In addition, overtopping is likely to occur for flood flows, which would allow free-flowing-like conditions, further minimising potential impacts of the temporary crossings. The following mitigation procedures would be implemented to mitigate the impact of riparian vegetation clearance on the structure of the riparian zone: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)**to reduce entrainment of loose material. As well as the following measures in the **REAC, Document reference: D.6.5.1:** • **D-WR-027** • **D-WR-028** • **D-WR-029** • **D-WR-045** • **D-WR-047** • **D-WR-048**

Quality Element	Potential Impact	Mitigation
		• **D-WR-049** • **D-WR-050** • **D-WR-051** Therefore, the impact of temporary watercourse crossings on river continuity is expected to be of negligible impact at the water body scale.
River Depth and Width Variation	**Generic Impact** Temporary watercourse crossings would directly alter the cross-sectional profile of the river and therefore alter the river depth and width variation whilst the temporary structure is in place. These impacts would be limited to the Construction Stage.	**Generic Mitigation** The following mitigation procedures would be implemented to mitigate the impact of riparian vegetation clearance on the structure of the riparian zone: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)**to reduce entrainment of loose material. As well as the following measures in the **REAC, Document reference: D.6.5.1:** • **D-WR-027** • **D-WR-028** • **D-WR-029** • **D-WR-045** • **D-WR-047** • **D-WR-048** • **D-WR-049** • **D-WR-050** • **D-WR-051** Therefore, the impact of temporary watercourse crossings on the river depth and width variation is expected to be of negligible impact at the water body scale.
Structure and Substrate of the River Bed	**Generic Impact** Temporary watercourse crossings would directly alter the structure and substrate of the riverbed by introducing new artificial material to the bed and banks of the channel whilst the temporary structure is in place. These impacts would be limited to the Construction Stage.	**Generic Mitigation** The following mitigation procedures would be implemented to mitigate the impact of riparian vegetation clearance on the structure of the riparian zone: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)**to reduce entrainment of loose material. As well as the following measures in the **REAC, Document reference: D.6.5.1:** • **D-WR-027** • **D-WR-028** • **D-WR-029** • **D-WR-045** • **D-WR-047** • **D-WR-048** • **D-WR-049** • **D-WR-050** • **D-WR-051**

Quality Element	Potential Impact	Mitigation
		Therefore, the impact of temporary watercourse crossings on the structure and substrate of the riverbed is expected to be of negligible impact at the water body scale.
Structure of the Riparian Zone	**Generic Impact** Temporary watercourse crossings would directly alter the structure of the riparian zone by requiring the removal of riparian vegetation and the introduction of artificial material whilst the temporary structure is in place. These impacts would be limited to the Construction Stage.	**Generic Mitigation** The following mitigation procedures would be implemented to mitigate the impact of riparian vegetation clearance on the structure of the riparian zone: • Adoption and implementation of measures and controls within the **OCEMP (Document reference: D.6.5.4)**to reduce entrainment of loose material. As well as the following measures in the **REAC, Document reference: D.6.5.1:** • **D-WR-027** • **D-WR-028** • **D-WR-029** • **D-WR-045** • **D-WR-047** • **D-WR-048** • **D-WR-049** • **D-WR-050** • **D-WR-051** Therefore, the impact of temporary watercourse crossings on structure of the riparian zone is expected to be of negligible impact at the water body scale.

DEWATERING

Table 5.6: Impact on the WFD Quality elements from dewatering on relevant water bodies

Quality Element	Potential Impact	Mitigation
Relevant water bodies: Ince Marshes; Mersey; Gowy; Stanney Mill Brook; Manchester Ship Canal; Finchetts Gutter; Garden City Drain; Sandycroft Drain; Wepre Brook; and Dee (N.Wales)		
Surface water		
Physico-Chemical		
Thermal Conditions	Dewatering can create a dry reach with exposure to higher thermal conditions on the pumped floodplain, and the opposite on the floodplain receiving the water. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourses. Hence, given the localised nature of this activity and the much larger area of the water bodies, the impact of dewatering is expected to be negligible at the WFD water body scale.
Oxygenation Conditions	Dewatering can increase oxygenation on the pumped floodplain and the opposite effect on the receiving floodplain. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourses. Hence, given the localised nature of this activity and the much larger area of the water bodies, the impact of dewatering is expected to be negligible at the WFD water body scale.
Salinity	Dewatering can alter existing salt levels on the pumped and receiving floodplains. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourses. Additionally, dewatering would be undertaken using portable pumps to take the water from the trenches/excavations and pump it into mobile containerised tanks. The tanks will have weirs to allow suspended solids and sediment to settle. 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 would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of dewatering is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied.
Acidification Status	Dewatering can alter the pH on the pumped and receiving floodplains. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourses. Additionally, dewatering would be undertaken using portable pumps to take the water from the trenches/excavations and pump it into mobile containerised tanks. The tanks will have weirs to allow suspended solids and sediment to settle. 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 would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of dewatering is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied.
Nutrient Conditions	Dewatering can alter nutrient conditions on the pumped and receiving floodplains. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourses. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of dewatering is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied.

Quality Element	Potential Impact	Mitigation
Priority Hazardous Substances	Dewatering can increase priority hazardous substances in the floodplain receiving water. Through time, overland erosion can transport those substances to the watercourses. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourses. Additionally, dewatering would be undertaken using portable pumps to take the water from the trenches/excavations and pump it into mobile containerised tanks. The tanks will have weirs to allow suspended solids and sediment to settle. 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 would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of dewatering is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied.
Hydromorphological		
Quantity and Dynamics of Water Flow	Floodplain dewatering can alter the base flow and hydraulic connectivity with the open channel flow. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourses. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of dewatering is expected to be negligible at the WFD water body scale.
River Depth and Width Variation	Floodplain dewatering can alter the base flow and hydraulic connectivity with the open channel flow, potentially altering the river depth and width variation. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourses. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of dewatering is expected to be negligible at the WFD water body scale.
Structure and Substrate of the River Bed	Floodplain dewatering can alter the base flow and hydraulic connectivity with the open channel flow, potentially resulting in changes in discharge and in the riverbed characteristics. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourses. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of dewatering is expected to be negligible at the WFD water body scale.
Transitional		
Physico-Chemical		
Transparency	Floodplain dewatering can transfer suspended solids from the pumped floodplain to the receiving one. Therefore, there is a potential to impact the watercourse transparency via overland erosion on the floodplain. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourses. Additionally, dewatering would be undertaken using portable pumps to take the water from the trenches/excavations and pump it into mobile containerised tanks. The tanks would have weirs to allow suspended solids and sediment to settle. Regular quality testing of the water would take place after it has passed through the weirs to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of dewatering is expected to be negligible at the WFD water body scale.

Quality Element	Potential Impact	Mitigation
Thermal Conditions	Dewatering can create a dry reach with exposure to higher thermal conditions on the pumped floodplain, and the opposite on the floodplain receiving the water. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourses. Hence, given the localised nature of this activity and the much larger area of the water bodies, the impact of dewatering is expected to be negligible at the WFD water body scale.
Oxygenation Conditions	Dewatering can increase oxygenation on the pumped floodplain and the opposite effect on the receiving floodplain. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourses. Hence, given the localised nature of this activity and the much larger area of the water bodies, the impact of dewatering is expected to be negligible at the WFD water body scale.
Nutrient Conditions	Dewatering can alter nutrient conditions on the pumped and receiving floodplains. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourses. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of dewatering is expected to be negligible at the WFD water body scale.
Priority Hazardous Substances	Dewatering can increase priority hazardous substances in the floodplain receiving water. Through time, overland erosion can transport those substances to the watercourses. This impact would be temporary in nature and limited to the Construction Stage.	Local floodplain dewatering process is not expected to be significant enough to impact the adjacent watercourses. Additionally, dewatering would be undertaken using portable pumps to take the water from the trenches/excavations and pump it into mobile containerised tanks. The tanks would have weirs to allow suspended solids and sediment to settle. Regular quality testing of the water would take place after it has passed through the weirs to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of dewatering is expected to be negligible at the WFD water body scale.

HYDROSTATIC TESTING

Table 5.7: Impact on the WFD Quality elements from hydrostatic testing on relevant water bodies

Quality Element	Potential Impact	Mitigation
Relevant water bodies: Ince Marshes; Mersey; Gowy; Stanney Mill Brook; Manchester Ship Canal; Finchetts Gutter; Garden City Drain; Sandycroft Drain; Wepre Brook; SUC and Dee (N.Wales)		
Surface water and Transitional/Coastal		
Biological		
Macrophytes & Phytoplankton	**Generic Impacts** Hydrostatic testing could impact the physico-chemical and hydromorphological conditions of affected watercourses in case of leakage, which could cause direct damage and/or habitat degradation. This impact would be temporary in nature and limited to the Construction Stage.	**Generic Mitigation** Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourses. Additionally, hydrostatic testing would be undertaken using waters with similar physico-chemical characteristics to the crossed watercourses. Regular quality testing of the water will take place after it has passed through the pipeline to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. In addition, temporary discharges would comply with the requirements for permits on Main Rivers from the Environment Agency/Natural Resources Wales, both regarding acceptable discharge volumes and water quality (**D-WR-030 of the REAC, Document reference:D.6.5.1**).
Invertebrates	**Generic Impacts** Hydrostatic testing could impact the physico-chemical and hydromorphological conditions of affected watercourses in case of leakage, which could cause direct damage to invertebrates and/or habitat degradation. This impact would be temporary in nature and limited to the Construction Stage.	**Generic Mitigation** Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourses. Additionally, hydrostatic testing would be undertaken using waters with similar physico-chemical characteristics to the crossing watercourses. Regular quality testing of the water will take place after it has passed through the pipeline to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC, Document reference:D.6.5.1**
Fish	**Generic Impacts** Hydrostatic testing could impact the physico-chemical and hydromorphological conditions of affected watercourses in case of leakage, which could cause direct damage to fish and/or habitat degradation. This impact would be temporary in nature and limited to the Construction Stage.	**Generic Mitigation** Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourses. Additionally, hydrostatic testing would be undertaken using waters with similar physico-chemical characteristics to the crossing watercourses. Regular quality testing of the water will take place after it has passed through the pipeline to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC, Document reference:D.6.5.1**

Quality Element	Potential Impact	Mitigation
Relevant water bodies: Ince Marshes; Mersey; Gowy; Stanney Mill Brook; Manchester Ship Canal; Finchetts Gutter; Garden City Drain; Sandycroft Drain; Wepre Brook; SUC and Dee (N.Wales)		
<u>Surface water</u>		
<u>Physico-Chemical</u>		
Thermal Conditions	Hydrostatic testing can alter the thermal conditions on the channel-floodplain in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourses. Hence, given the localised nature of this activity and the much larger area of the water bodies, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale. **D-WR-030 of the REAC, Document reference:D.6.5.1**
Oxygenation Conditions	Hydrostatic testing can increase oxygenation on the channel-floodplain in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourses. Hence, given the localised nature of this activity and the much larger area of the water bodies, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale. **D-WR-030 of the REAC, Document reference:D.6.5.1**
Salinity	Hydrostatic testing can alter salt levels on the channel-floodplain in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourses. Additionally, hydrostatic testing would be undertaken using waters with similar physico-chemical characteristics to the crossing watercourses. Regular quality testing of the water will take place after it has passed through the pipeline to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC, Document reference:D.6.5.1**
Acidification Status	Hydrostatic testing can alter the pH on the channel-floodplain in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourses. Additionally, hydrostatic testing would be undertaken using waters with similar physico-chemical characteristics to the crossing watercourses. Regular quality testing of the water will take place after it has passed through the Newbuild Carbon Dioxide Pipeline to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC, Document reference:D.6.5.1**
Nutrient Conditions	Hydrostatic testing can alter existing nutrient conditions on the channel-floodplain in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourses Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC, Document reference:D.6.5.1**

Quality Element	Potential Impact	Mitigation
Priority Hazardous Substances	Hydrostatic testing can release priority hazardous substances on the channel-floodplain in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourses. Additionally, hydrostatic testing would be undertaken using waters with similar physico-chemical characteristics to the crossing watercourses. Regular quality testing of the water will take place after it has passed through the Newbuild Carbon Dioxide Pipeline to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC, Document reference:D.6.5.1**
Hydromorphological		
Quantity and Dynamics of Water Flow	Hydrostatic testing can alter the base flow and hydraulic connectivity with the open channel flow in case of leakage which could impact the quantity and dynamics of water flow. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourses. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC, Document reference:D.6.5.1**
River Depth and Width Variation	Hydrostatic testing can alter the base flow and hydraulic connectivity with the open channel flow, potentially resulting in river depth and width variation in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourses. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC, Document reference:D.6.5.1**
Structure and Substrate of the River Bed	Hydrostatic testing can alter the base flow and hydraulic connectivity with the open channel flow, potentially resulting in changes in discharge and in the riverbed characteristics in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourses. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC, Document reference:D.6.5.1**
Transitional		
Physico-Chemical		
Transparency	Hydrostatic testing can transfer suspended solids from the added water to the receiving channel-floodplain in case of leakage. Therefore, there is a potential to impact the watercourse transparency via overland erosion on the floodplain and direct release of suspended solid into the channel. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourses. Additionally, hydrostatic testing would be undertaken using waters with similar physico-chemical characteristics to the crossing watercourses. Regular quality testing of the water would take place after it has passed through the Newbuild Carbon Dioxide Pipeline to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC, Document reference:D.6.5.1**

Quality Element	Potential Impact	Mitigation
Oxygenation Conditions	Hydrostatic testing can increase oxygenation on the channel-floodplain in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourses. Hence, given the localised nature of this activity and the much larger area of the water bodies, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale. **D-WR-030 of the REAC, Document reference:D.6.5.1**
Nutrient Conditions	Hydrostatic testing can alter existing nutrient conditions on the channel-floodplain in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourses Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC, Document reference:D.6.5.1**
Priority Hazardous Substances	Hydrostatic testing can release priority hazardous substances on the channel-floodplain in case of leakage. This impact would be temporary in nature and limited to the Construction Stage.	Local channel-floodplain leakage is not expected to be significant enough to impact the adjacent watercourses. Additionally, hydrostatic testing would be undertaken using waters with similar physico-chemical characteristics to the crossing watercourses. Regular quality testing of the water will take place after it has passed through the Newbuild Carbon Dioxide Pipeline to determine if further treatment is required prior to discharge, which would be to a nearby watercourse or if none is present, to greenfield surface. Therefore, besides the localised nature of this activity and the much larger area of the water bodies, the impact of hydrostatic testing is expected to be negligible at the WFD water body scale, if all mitigation measures are correctly applied. **D-WR-030 of the REAC, Document reference:D.6.5.1**

CULVERT REPLACEMENT AND EXTENSION

Table 5.8: Impact on the WFD Quality elements from culvert replacement and extension on relevant water body

Quality Element	Potential Impact	Mitigation
Relevant water bodies: Ince Marshes		
Surface water and Transitional/Coastal		
Biological		
Fish	Culvert replacement and extension within the Ince Marshes water body could cause alterations to the hydromorphological conditions of the affected watercourses, which may obstruct fish passage, and cause loss and/or fragmentation of habitats. The replacement of the culvert would pose potential construction impacts and the extension operational impacts.	Where necessary and practicable, the installation of temporary culverts and causeways/access routes within watercourses will avoid sensitive fish migration and spawning periods: • 1 October to 31 April - European eel, lamprey and salmonids. • 15 March to 15 June - Coarse fish. The requirement for such structures would be determined during the detailed design stage of the DCO Proposed Development. Where unable to be accommodated outwith fish migration and spawning periods, liaison with NRW/EA will be required with applications for exemptions sought. (**D-BD-050 of the REAC, Document reference: D.6.5.1**) Temporary culverts required on main watercourses (i.e. not field ditches) will be suitability sized and designed/installed to Environment Agency Fish Pass standards (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/298053/geho0910btbp-e-e.pdf) to facilitate passage of eel, lamprey, salmonids and coarse fish species. (**D-BD-051 of the REAC, Document reference: D.6.5.1**) **D-WR-048 of the REAC, Document reference:D.6.5.1.** Therefore, by applying these mitigation measures, no impact on fish is predicted on a water body scale
Surface water		
Physico-Chemical		
Thermal Conditions	Culvert replacement and extension could alter exposure to light, hence, changing local thermal conditions of the watercourse within the Ince Marshes water body. The replacement of the culvert would pose potential construction impacts and the extension operational impacts.	The new culvert would be designed to fit existing watercourse hydraulics and sediment transport processes. By doing this, the design culvert would be expected to cause minimal disruption to natural processes, e.g., permitting a free-flow and an effective sediment discharge. It would be further designed to better environmental standards than the existing one. In addition, the culvert dimension (metre-long) is much shorter than the water body length (kilometre-long), hence, absorbing the overall remaining environmental impact. Therefore, the final potential impact of the culvert replacement and extension is not foreseen to significantly impact the thermal conditions on a water body scale.
Oxygenation Conditions	Culvert replacement and extension could alter exposure to light and trigger flow impoundment, hence, changing local oxygenation conditions of the watercourse within the Ince Marshes water body. The replacement of the culvert would	The new culvert would be designed to fit existing watercourse hydraulics and sediment transport processes. By doing this, the design culvert would be expected to cause minimal disruption to natural processes, e.g., permitting a free-flow and an effective sediment discharge. It would be further designed to better environmental standards than the existing one. In addition, the culvert dimension (metre-long) is much shorter than the water body length (kilometre-long), hence, absorbing the

Quality Element	Potential Impact	Mitigation
	pose potential construction impacts and the extension operational impacts.	overall remaining environmental impact. Therefore, the final potential impact of the culvert replacement and extension is not foreseen to significantly impact the oxygenation conditions on a water body scale.
Nutrient Conditions	Culvert replacement and extension could alter exposure to light and trigger flow impoundment, hence, changing local nutrient conditions of the watercourse within the Ince Marshes water body. The replacement of the culvert would pose potential construction impacts and the extension operational impacts.	The new culvert would be designed to fit existing watercourse hydraulics and sediment transport processes. By doing this, the design culvert would be expected to cause minimal disruption to natural processes, e.g., permitting a free-flow and an effective sediment discharge. It would be further designed to better environmental standards than the existing one. In addition, the culvert dimension (metre-long) is much shorter than the water body length (kilometre-long), hence, absorbing the overall remaining (if any) environmental impact. Therefore, the final potential impact of the culvert replacement and extension is not foreseen to significantly impact the nutrient conditions on a water body scale.
Hydromorphological		
Quantity and Dynamics of Water Flow	Culvert replacement and extension could trigger flow impoundment, and therefore potentially impact the quantity and dynamics of water flow of the watercourse within the Ince Marshes water body. The replacement of the culvert would pose potential construction impacts and the extension operational impacts.	The new culvert would be designed to fit existing watercourse hydraulics and sediment transport processes. By doing this, the design culvert would be expected to cause minimal disruption to natural processes, e.g., permitting a free-flow and an effective sediment discharge. It would be further designed to better environmental standards than the existing one. In addition, the culvert dimension (metre-long) is much shorter than the water body length (kilometre-long), hence, absorbing the overall remaining (if any) environmental impact. Therefore, the final potential impact of the culvert replacement and extension is not foreseen to significantly impact quantity and dynamics of water flow on a water body scale.
River Continuity	Culvert replacement and extension could trigger flow impoundment, and therefore potentially impact the river continuity of the watercourse within the Ince Marshes water body. The replacement of the culvert would pose potential construction impacts and the extension operational impacts.	The new culvert would be designed to fit existing watercourse hydraulics and sediment transport processes. By doing this, the design culvert would be expected to cause minimal disruption to natural processes, e.g., permitting a free-flow and an effective sediment discharge. It would be further designed to better environmental standards than the existing one. In addition, the culvert dimension (metre-long) is much shorter than the water body length (kilometre-long), hence, absorbing the overall remaining (if any) environmental impact. Therefore, the final potential impact of the culvert replacement and extension is not foreseen to significantly impact river continuity on a water body scale.
River Depth and Width Variation	Culvert replacement and extension could trigger flow impoundment, and therefore potentially impact the river depth and width variation of the watercourse within the Ince Marshes water body. The replacement of the culvert would pose potential construction impacts and the extension operational impacts.	The new culvert would be designed to fit existing watercourse hydraulics and sediment transport processes. By doing this, the design culvert would be expected to cause minimal disruption to natural processes, e.g., permitting a free-flow and an effective sediment discharge. It would be further designed to better environmental standards than the existing one. In addition, the culvert dimension (metre-long) is much shorter than the water body length (kilometre-long), hence, absorbing the overall remaining (if any) environmental impact. Therefore, the final potential impact of the culvert replacement and extension is not foreseen to significantly impact river depth and width variation on a water body scale.
Structure and Substrate of the River Bed	Culvert replacement and extension could trigger flow impoundment, and therefore potentially impact the structure and substrate of the riverbed of the watercourse within the Ince Marshes water body. The replacement of the	The new culvert would be designed to fit existing watercourse hydraulics and sediment transport processes. By doing this, the design culvert would be expected to cause minimal disruption to natural processes, e.g., permitting a free-flow and an effective sediment discharge. It would be further designed to better environmental standards than the existing one. In addition, the culvert dimension (metre-long) is much shorter than the water body length (kilometre-long), hence, absorbing the overall remaining (if any) environmental impact. Therefore, the final potential impact of the culvert replacement and extension is not foreseen to significantly impact structure and substrate of the riverbed on a water body scale.

Quality Element	Potential Impact	Mitigation
	culvert would pose potential construction impacts and the extension operational impacts.	
Structure of the Riparian Zone	Culvert replacement and extension could trigger flow impoundment, and therefore potentially impact the structure of the riparian zone of the watercourse within the Ince Marshes water body. The replacement of the culvert would pose potential construction impacts and the extension operational impacts.	The new culvert would be designed to fit existing watercourse hydraulics and sediment transport processes. By doing this, the design culvert would be expected to cause minimal disruption to natural processes, e.g., permitting a free-flow and an effective sediment discharge. It would be further designed to better environmental standards than the existing one. In addition, the culvert dimension (metre-long) is much shorter than the water body length (kilometre-long), hence, absorbing the overall remaining (if any) environmental impact. Therefore, the final potential impact of the culvert replacement and extension is not foreseen to significantly impact structure of the riparian zone on a water body scale.

ABOVE GROUND INSTALLATIONS

Table 5.9: Impact on the WFD Quality elements from construction of AGIs on relevant water bodies

Quality Element	Potential Impact	Mitigation
Relevant water bodies: Ince Marshes		
Surface water		
Structure of the Riparian Zone	The construction of Ince AGI may result in riparian vegetation removal for the enabling and construction works causing changes to the structure of the riparian zone. In addition, the AGIs may result in a permanent change in the structure of the riparian zone during operation.	The construction area would be kept to a minimum, hence, reducing required vegetation clearance. The Ince AGI site footprint is 0.0018 km^2, which is far smaller than the catchment area of the Ince Marshes (26.4 km^2). The **LEMP (Document reference: D.6.5.5)** includes riparian planting for 50m along the East Central Drain, which is also shown on the **Landscape Layouts (Document reference: D.2.14).** No significant impact is foreseen to the structure of the riparian zone on a water body scale due to the construction and operation of the AGIs.

DRAINAGE AND OUTFALLS

Table 5.10: Impact on the WFD Quality elements from new drainage and outfalls on relevant water bodies

Quality Element	Potential Impact	Mitigation
Relevant water bodies: Ince Marshes, Manchester Ship Canal, Mersey, Finchetts Gutter, Wepre Brook, Swinchiard Brook and Dee (N. Wales)		
Surface water and transitional/coastal		
Biological		
Invertebrates	Drainages and outfalls can alter the physico-chemical and hydromorphological conditions of the water bodies, which can negatively impact invertebrate quality elements. Potential impacts could occur during the construction and Operational Stage.	Potential impacts to invertebrates through deterioration of the physico-chemical condition would be mitigated through treatment measures. These measures are filter drain, vortex separator, and attenuation ponds. In conjunction, these treatments ensure that any pluvial water returning to a watercourse would achieve good standards of quality through removal of any physical and chemical disturbance, hence minimising any detrimental impact on WFD quality elements. Potential impacts to invertebrates through deterioration of the hydromorphological condition would be mitigated through two embedded mitigation measures. These measures are setting back the outfall and regulating the returning flow. By setting back the outfall, there would be an open channel connecting the pluvial and fluvial waters, ensuring that no permanent structure is installed within the river corridor. Outfall flow would be restricted to 2l/s, which is as close to greenfield rates as practicable. Therefore, by applying these mitigation measures, no significant impact on the invertebrate conditions is expected from the required drainages and outfalls either local or at the water body scale.
Fish	Drainages and outfalls can alter the physico-chemical and hydromorphological conditions of the water bodies, which can negatively impact fish quality elements. Potential impacts could occur during the construction and Operational Stage.	Potential impacts to fish through deterioration of the physico-chemical condition would be mitigated through treatment measures. These measures are filter drain, vortex separator, and attenuation ponds. In conjunction, these treatments ensure that any pluvial water returning to a watercourse would achieve good standards of quality through removal of any physical and chemical disturbance, hence minimising any detrimental impact on WFD quality elements. Potential impacts to fish through deterioration of the hydromorphological condition would be mitigated through two embedded mitigation measures. These measures are setting back the outfall and regulating the returning flow. By setting back the outfall, there would be an open channel connecting the pluvial and fluvial waters, ensuring that no permanent structure is installed within the river corridor. Outfall flow would be restricted to 2l/s, which is as close to greenfield rates as practicable. Therefore, by applying these mitigation measures, no significant impact on the fish population is expected from the required drainages and outfalls either local or at the water body scale.

Quality Element	Potential Impact	Mitigation
Surface water		
Physico-Chemical		
Thermal Conditions	Drainages and outfalls can release suspended solids and dissolved chemical load. Therefore, potentially altering the existing thermal conditions. Potential impacts could occur during the construction and Operational Stage.	Potential impacts to thermal condition would be mitigated through treatment measures. These measures are filter drain, vortex separator, and attenuation ponds. In conjunction, these treatments ensure that any pluvial water returning to a watercourse would achieve good standards of quality through removal of any physical and chemical disturbance, hence minimising any detrimental impact on WFD quality elements. Therefore, by applying those treatment measures, no significant impact on thermal conditions is expected from the required drainages and outfalls either local or at the water body scale.
Oxygenation Conditions	Drainages and outfalls can release suspended solids and dissolved chemicals to the water bodies. Therefore, potentially altering the existing oxygenation conditions. Potential impacts could occur during the construction and Operational Stage.	Potential impacts to oxygenation condition would be mitigated through treatment measures. These measures are filter drain, vortex separator, and attenuation ponds. In conjunction, these treatments ensure that any pluvial water returning to a watercourse would achieve good standards of quality through removal of any physical and chemical disturbance, hence minimising any detrimental impact on WFD quality elements. Therefore, by applying those treatment measures, no significant impact on oxygenation conditions is expected from the required drainages and outfalls either local or at the water body scale.
Acidification Status	Drainages and outfalls can release suspended solids and dissolved chemical to the water bodies. Therefore, potentially altering the existing pH status. Potential impacts could occur during the construction and Operational Stage.	Potential impacts to acidification status would be mitigated through treatment measures. These measures are filter drain, vortex separator, and attenuation ponds. In conjunction, these treatments ensure that any pluvial water returning to a watercourse would achieve good standards of quality through removal of any physical and chemical disturbance, hence minimising any detrimental impact on WFD quality elements. Therefore, by applying those treatment measures, no significant impact on acidification status is expected from the required drainages and outfalls either local or at the water body scale.
Nutrient Conditions	Drainages and outfalls can release suspended solids and dissolved chemical to the water bodies. Therefore, potentially altering the existing nutrient conditions. Potential impacts could occur during the construction and Operational Stage.	Potential impacts to nutrient conditions would be mitigated through treatment measures. These measures are filter drain, vortex separator, and attenuation ponds. In conjunction, these treatments ensure that any pluvial water returning to a watercourse would achieve good standards of quality through removal of any physical and chemical disturbance, hence minimising any detrimental impact on WFD quality elements. Therefore, by applying those treatment measures, no significant impact on acidification status is expected from the required drainages and outfalls either local or at the water body scale.
Priority Hazardous Substances	Drainages and outfalls can release suspended solids and dissolved chemical to the water bodies. Therefore, potentially altering the existing priority hazardous substances levels. Potential impacts	Potential impacts to existing priority hazardous substances levels would be mitigated through treatment measures. These measures are filter drain, vortex separator, and attenuation ponds. In conjunction, these treatments ensure that any pluvial water returning to a watercourse would achieve good standards of quality through removal of any physical and chemical disturbance, hence minimising any detrimental impact on WFD quality elements. Therefore, by applying those treatment measures, no significant impact on existing priority hazardous substances levels is expected from the required drainages and outfalls either local or at the water body scale.

Quality Element	Potential Impact	Mitigation
	could occur during the construction and Operational Stage.	
Hydromorphological		
Quantity and Dynamics of Water Flow	Drainages and outfalls can directly rearrange the natural quantity and dynamics of water flow. Potential impacts could occur during the construction and Operational Stage.	Two embedded mitigation measures have been designed to the new drainage and outfalls to reduce impacts on the natural quantity and dynamics of water flow. These measures are setting back the outfall and regulating the returning flow. By setting back the outfall, there would be an open channel connecting the pluvial and fluvial waters, ensuring that no permanent structure is installed within the river corridor. Outfall flow would be restricted to 2l/s, which is as close to greenfield rates as practicable. Together, these mitigation measures are expected to eliminate any detrimental impact to the natural quantity and dynamics of water flow within water bodies.
River Continuity	Drainages and outfalls can directly rearrange the natural river continuity. Potential impacts could occur during the construction and Operational Stage.	Two embedded mitigation measures have been designed to the new drainage and outfalls to reduce impacts on the natural river continuity. These measures are setting back the outfall and regulating the returning flow. By setting back the outfall, there would be an open channel connecting the pluvial and fluvial waters, ensuring that no permanent structure is installed within the river corridor. Outfall flow would be restricted to 2l/s, which is as close to greenfield rates as practicable. Together, these mitigation measures are expected to eliminate any detrimental impact to the natural river continuity within water bodies.
River Depth and Width Variation	Drainages and outfalls can directly rearrange the natural river depth and width variation. Potential impacts could occur during the construction and Operational Stage.	Two embedded mitigation measures have been designed to the new drainage and outfalls to reduce impacts on the natural river depth and width variation. These measures are setting back the outfall and regulating the returning flow. By setting back the outfall, there would be an open channel connecting the pluvial and fluvial waters, ensuring that no permanent structure is installed within the river corridor. Outfall flow would be restricted to 2l/s, which is as close to greenfield rates as practicable. Together, these mitigation measures are expected to eliminate any detrimental impact to the natural river depth and width variation within water bodies.
Structure and Substrate of the River Bed	Drainages and outfalls can directly rearrange the natural structure and substrate of the river bed. Potential impacts could occur during the construction and Operational Stage.	Two embedded mitigation measures have been designed to the new drainage and outfalls to reduce impacts on the natural structure and substrate of the river bed. These measures are setting back the outfall and regulating the returning flow. By setting back the outfall, there would be an open channel connecting the pluvial and fluvial waters, ensuring that no permanent structure is installed within the river corridor. Outfall flow would be restricted to 2l/s, which is as close to greenfield rates as practicable. Together, these mitigation measures are expected to eliminate any detrimental impact to the natural structure and substrate of the river bed within water bodies.
Structure of the Riparian Zone	Drainages and outfalls can directly alter the existing infiltration rate and lateral connectivity of the riparian zone. Potential impacts could occur during the construction and Operational Stage.	Two embedded mitigation measures have been designed to the new drainage and outfalls to reduce impacts on the riparian zone. These measures are setting back the outfall and regulating the returning flow. By setting back the outfall, there would be an open channel connecting the pluvial and fluvial waters, ensuring that no permanent structure is installed within the river corridor, and, hence, no changes to lateral connectivity (e.g., flood flows or greater). Outfall flow would be restricted to 2l/s, which is as close to greenfield rates as practicable, hence, favouring infiltration along the riparian zone. Together, these mitigation measures are expected to eliminate any detrimental impact to the natural structure of the riparian zone.
Transitional		
Physico-Chemical		
Transparency	Drainages and outfalls required in the temporary construction sites and accesses roads can release	Appropriate drainage systems would be incorporated in temporary construction areas and access roads where necessary to deposit any run-off into designated areas for general infiltration. The Temporary Construction Compounds are proposed typically to be

Quality Element	Potential Impact	Mitigation
	suspended solids and dissolved chemical to the water bodies. Therefore, potentially altering the existing transparency levels of the water bodies. Potential impacts could occur during the construction and Operational Stage.	surfaced via suitable crushed aggregate sub-base which would allow surface water to be managed through local infiltration. Therefore, no significant impact on transparency levels is expected at the water body scale from the required drainages and outfalls.
Thermal Conditions	Drainages and outfalls required in the temporary construction sites and accesses roads can release suspended solids and dissolved chemical to the water bodies. Therefore, potentially altering the existing thermal conditions of the water bodies. Potential impacts could occur during the construction and Operational Stage.	Appropriate drainage systems would be incorporated in temporary construction areas and access roads where necessary to deposit any run-off into designated areas for general infiltration. The Temporary Construction Compounds are proposed typically to be surfaced via suitable crushed aggregate sub-base which would allow surface water to be managed through local infiltration. Therefore, no significant impact on transparency levels is expected at the water body scale from the required drainages and outfalls.
Priority Hazardous Substances	Drainages and outfalls required in the temporary construction sites and accesses roads can release suspended solids and dissolved chemical to the water bodies. Therefore, potentially altering the existing priority hazardous substances levels of the water bodies. Potential impacts could occur during the construction and Operational Stage.	Appropriate drainage systems would be incorporated in temporary construction areas and access roads where necessary to deposit any run-off into designated areas for general infiltration. The Temporary Construction Compounds are proposed typically to be surfaced via suitable crushed aggregate sub-base which would allow surface water to be managed through local infiltration. Therefore, no significant impact on transparency levels is expected at the water body scale from the required drainages and outfalls.

5.3. STEP 3: REVIEW OF MITIGATION MEASURES TO DELIVER WFD OBJECTIVES

5.3.1. The high level WFD Mitigation Measures set out in the 2021 draft RBMP and 2015 official RBMP that are relevant to the DCO Proposed Development are considered for the North West RBD (**Table 5.12**), River Dee (North Wales) Transitional water body (**Table 5.11**), and Western Wales surface water body (**Table 5.13**). Mitigation measures set for individual WFD water bodies are reviewed in **Table 5-15** to **Table 5-19.**

Table 5.11: Mitigation measures available in the North West River Basin District 2015 RBMP and their relation to the DCO Proposed Development

Category	Mitigation measure	Justification
Measures to address physical modification	Improvement to condition of channel/bed and/or banks/shoreline	The only structural modifications proposed are in open cut crossings. However, the scale of the works is negligible compared to the size of the water body, and it would not impact existing or future improvements to channel/bed and/or banks.
Measures to address physical modification	Removal or modification of engineering structure	No addition of engineered works is proposed in-channel. In addition, the proposed works do not influence existing or future removal or of in-channel engineering structures.
Measures to address physical modification	Improvement to condition of riparian zone and/or wetland habitats	Vegetation clearance is expected to be spatially and temporarily limited. AGIs has a scale of the works is negligible compared to the size of the water body. Therefore, no consequent impact on riparian zone and/or wetland habitats improvements is foreseen.
Measures to address physical modification	Removal or easement of barriers to fish migration	No changes proposed to barriers to fish migration.
Measures to address physical modification	Change to operations and maintenance	No changes proposed to operations and maintenance.

Category	Mitigation measure	Justification
Measures to address physical modification	Vegetation management	Vegetation clearance is expected to be spatially and temporarily limited. AGIs has a scale of the works is negligible compared to the size of the water body. Therefore, no consequent impact on vegetation management is foreseen.
Measures to address pollution from wastewater	Mitigate/Remediate point source impacts on receptor	No changes proposed to wastewater.
Measures to address pollution from wastewater	Reduce diffuse pollution at source	No changes proposed to wastewater.
Measures to address pollution from wastewater	Reduce point source pathways (i.e., control entry to water environment)	No changes proposed to wastewater.
Measures to manage pollution from towns, cities and transport	Reduce diffuse pollution pathways (i.e., control entry to water environment)	No changes proposed to diffuse pollution pathway from towns, cities and transport.
Measures to manage pollution from towns, cities, and transport	Mitigate/Remediate diffuse pollution impacts on receptor	No changes proposed to diffuse pollution pathway from towns, cities and transport.
Measures to address changes to natural flow and level of water	Control pattern/timing of abstraction	No changes proposed to pattern/timing of abstraction.
Measures to address pollution from rural areas	Mitigate/Remediate diffuse pollution impacts on receptor	No changes proposed to diffuse pollution pathway from rural areas.
Measures to address pollution from rural areas	Reduce diffuse pollution at source	No changes proposed to diffuse pollution pathway from rural areas.
Measures to manage invasive non-native species	Mitigation, control, and eradication (to reduce extent)	Vegetation clearance is expected to be spatially and temporarily limited. In addition, no impact is foreseen on

Category	Mitigation measure	Justification
		mitigation, control, and eradication of invasive non-native species.
Measures to manage pollution from mine waters	Mitigate/Remediate point source impacts on receptor	No changes proposed to pollution pathway from mine waters.

Table 5.12: Mitigation measures available in the Dee (North Wales) 2021 draft RBMP and their relation to the DCO Proposed Development

Category	Mitigation measure	Justification
Navigation	49.Modify vessel design	No changes proposed to navigable channels.
Navigation	50.Vessel Management	No changes proposed to navigable channels.
Operations and maintenance	21.Avoid the need to dredge	No dredging proposed. No works in water bodies to impact any current dredging works.
Operations and maintenance	22.Dredging disposal strategy	No dredging proposed. No works in water bodies to impact any current dredging works.
Operations and maintenance	23.Reduce impact of dredging	No dredging proposed. No works in water bodies to impact any current dredging works.
Operations and maintenance	24.Reduce sediment resuspension	The crossings are unlikely to cause long-term sediment resuspension. The scale of the works is negligible compared to the size of the water body.
Operations and maintenance	25.Retime dredging or disposal	No dredging proposed. No works in water bodies to impact any current dredging works.
Operations and maintenance	26.Sediment management	The scale of the works is negligible compared to the size of the water body, and it would not impact existing or future sediment management operations.
Operations and maintenance	27. Dredge disposal site selection	No dredging proposed. No works in water bodies to impact any current dredging works.
Operations and maintenance	28.Manage disturbance	No dredging proposed. No works in water bodies to impact any current dredging works.

Category	Mitigation measure	Justification
Structural modification	14.Modify structure	No structural modification proposed. No works in water bodies to impact any current modification works.
Structural modification	15.Flow manipulation	No structural modification proposed. No works in water bodies to impact any current flow.
Working with physical form and function	1.Modify channel	No changes proposed to physical form and function. In addition, the installation of cabling will be buried to a suitable depth so as not to impede future lateral and vertical channel adjustment of those watercourses crossed by the DCO Proposed Development.
Working with physical form and function	2.Remove obsolete structure	No changes proposed to physical form and function. In addition, the installation of cabling will be buried to a suitable depth so as not to impede future lateral and vertical channel adjustment of those watercourses crossed by the DCO Proposed Development.

Table 5.13: Mitigation measures available in the Western Wales River Basin District 2015 RBMP and their relation to the DCO Proposed Development

Category	Mitigation measure	Justification
Measures to manage pollution from towns, cities and transport, rural area and mines	Control or manage diffuse source inputs: reduce diffuse pollution at source	No changes proposed to diffuse pollution pathway from towns, cities and transport, rural area, and mines.
Measures to manage pollution from towns, cities and transport, rural area and mines	Control or manage point sources: reduce point source pollution at source	No changes proposed to point source pollution pathway from towns, cities and transport, rural area, and mines.
Measures to address physical modification	Improve regulated flows: appropriate management of water releases	No changes proposed to regulated flows.
Measures to address physical modification	Improve modified habitat: Removal or easement of barriers to fish migration	No changes proposed to barriers to fish migration. There would be potential for failure of the permanent works at Alltami Brook which could cause a blockage to fish migration in the water body. Ongoing monitoring of the permanent works would be carried out and adaptive mitigation implemented to prevent this becoming a barrier in the future (**D-WR-065 of the REAC, Document reference: D.6.5.1**).
Measures to address physical modification	Improve modified habitat: Improvement to condition of channel/bed and/or banks/shoreline	The only structural modifications proposed are in open cut crossings. However, the scale of the works is negligible compared to the size of the water body, and it would not impact existing or future improvements to channel/bed and/or banks.
Measures to manage invasive non-native species	Mitigation, control, and eradication (to reduce extent)	Vegetation clearance is expected to be spatially and temporarily limited. In addition, no impact is foreseen on mitigation, control, and eradication of invasive non-native species.
Measures to address pollution from waste water	Mitigate/Remediate point source impacts on receptor	No changes proposed to point source pollution pathway from towns, cities and transport, rural area, and mines.

Category	Mitigation measure	Justification
Measures to address pollution from waste water	Reduce diffuse pollution at source	No changes proposed to diffuse pollution pathway from towns, cities and transport, rural area, and mines.
Measures to address pollution from waste water	Reduce point source pathways (i.e., control entry to water environment)	No changes proposed to point source pollution pathway from towns, cities and transport, rural area, and mines.
Measures to address changes to natural flow and level of water	Control pattern/timing of abstraction	No changes proposed to regulated flows.

Table 5.14: Mitigation measures in the Gowy (Milton Brook to Mersey) water body

Category	Measure	Justification
Operations and Maintenance	Sediment management strategy	The Newbuild Carbon Dioxide Pipeline will be buried at least 1.2m below bed level and will not permanently impact sediment management. The pipe will be laid using trenchless methods and will not temporarily disturb the sediment within the River Gowy.
Structural Modification	Enhance ecology	The Newbuild Carbon Dioxide Pipeline will be buried and therefore would not adversely impact ecology long-term. Future enhancement would be possible.
Working with Physical Form and Function	Remove obsolete structure	The Newbuild Carbon Dioxide Pipeline will be buried at least 1.2m below the bed of watercourses. There will be no change to structures within the watercourses and the Newbuild Carbon Dioxide Pipeline will not prevent the removal of structures in the future.
Working with Physical Form and Function	In-channel morph diversity	The Newbuild Carbon Dioxide Pipeline will be buried at least 1.2m below the bed of watercourses so future morphological diversity improvements can be implemented. For open cut crossings, the bed and banks of the watercourses would be reinstated as per baseline conditions.
Working with Physical Form and Function	Floodplain connectivity	The Newbuild Carbon Dioxide Pipeline will be buried at least 1.2m below bed level beneath the Gowy and beneath up to 100m of the left bank floodplain of the Gowy to account for future floodplain connectivity. The right bank flood defence is not likely to be set further back due to the existing land fill site.
Working with Physical Form and Function	Preserve or restore habitats	The Newbuild Carbon Dioxide Pipeline would be buried 1.2m below bed level and therefore future habitat restoration would not be prevented by the Newbuild Carbon Dioxide Pipeline. Riparian habitats to be disturbed within the wider water

		body due to open cut crossings are anticipated to recover within two years of the Construction Stage.

Table 5.15: Mitigation measures in the Stanney Mill Brook water body

Category	Measure	Justification
Structural Modification	Fish passes	There are no new fish passes or changes to fish passes proposed. There will be no structures within the watercourse which would prevent or require the installation fish passes.
Working with Physical Form and Function	In-channel morph diversity	The Newbuild Carbon Dioxide Pipeline will be buried at least 1.2m below the bed of watercourses so future morphological diversity improvements can be implemented. For open cut crossings, the bed and banks of the watercourses would be reinstated as per baseline conditions.
Working with Physical Form and Function	Floodplain connectivity	The Newbuild Carbon Dioxide Pipeline will be buried at least 1.2m below bed level. The bed and banks of watercourses would be reinstated as per baseline following open cut crossing. No further disconnectivity is proposed and the buried Newbuild Carbon Dioxide Pipeline depth would not prevent the watercourse from being reconnected to its floodplain.

Table 5.16: Specific mitigation measures in the Finchetts Gutter water body

Category	Measure	Justification
Working with Physical Form and Function	In-channel morph diversity	The Newbuild Carbon Dioxide Pipeline will be buried at least 1.2m below the bed of watercourses so future morphological diversity improvements can be implemented. For open cut crossings, the bed and banks of the watercourses would be reinstated as per baseline conditions.
Working with Physical Form and Function	Preserve or restore habitat	The Newbuild Carbon Dioxide Pipeline would be buried 1.2m below bed level and therefore future habitat restoration would not be prevented by the Newbuild Carbon Dioxide Pipeline. Most riparian habitats to be disturbed within the wider water body due to open cut crossings are anticipated to recover within two years of the Construction Stage. There would be some habitat loss (up to 32m on both banks) on tributaries of Finchetts Gutter (namely, Backford Brook, Friars Park Ditch and Finchetts Gutter Tributary). Vegetation would be replanted however it would likely be medium-term mitigation. Additional riparian planting will be implemented within the Newbuild Infrastructure Boundary.
Working with Physical Form and Function	Floodplain connectivity	The Newbuild Carbon Dioxide Pipeline will be buried at least 1.2m below bed level. The bed and banks of watercourses would be reinstated as per baseline following open cut crossing. No further disconnectivity is proposed and the buried Newbuild Carbon Dioxide Pipeline depth would not prevent the watercourse from being reconnected to its floodplain.

Table 5.17: Mitigation measures in place in the Dee (N. Wales) transitional water body

Category	Measure	Justification
Navigation	Modify vessel design	The Newbuild Carbon Dioxide Pipeline will be buried at least 15m below the bed of the Dee. This will not affect navigation.
Navigation	Vessel management	
Operations and Maintenance	Avoid the need to dredge	The Newbuild Carbon Dioxide Pipeline will be buried at least 1.2m below the bed of the Dee. This will not affect sediment management and dredging.
Operations and Maintenance	Dredging disposal strategy	
Operations and Maintenance	Reduce impact of dredging	
Operations and Maintenance	Reduce sediment resuspension	The Newbuild Carbon Dioxide Pipeline will be buried at least 1.2m below the bed of the Dee. This will not affect sediment management and dredging. The Newbuild Carbon Dioxide Pipeline will be laid via trenchless methods and will not disturb in-channel sediment.
Operations and Maintenance	Retime dredging or disposal	The Newbuild Carbon Dioxide Pipeline will be buried at least 1.2m below the bed of the Dee. This will not affect sediment management and dredging.
Operations and Maintenance	Sediment management	
Operations and Maintenance	Dredge disposal site selection	
Operations and Maintenance	Manage disturbance	The Newbuild Carbon Dioxide Pipeline will be buried at least 1.2m below the bed of the Dee. This will not affect sediment management and dredging. The Newbuild Carbon Dioxide Pipeline will be laid via trenchless methods and will not disturb in-channel sediment.

Category	Measure	Justification
Structural Modification	Modify structure	The Newbuild Carbon Dioxide Pipeline will be buried at least 1.2m below the bed of the Dee. There will be no change to structures within the Dee and the Newbuild Carbon Dioxide Pipeline will not prevent the modification of structures in the future.
Structural Modification	Flow manipulation	The Newbuild Carbon Dioxide Pipeline will be buried at least 1.2m below the bed of the Dee. There will be no change to flow control within the Dee and the Newbuild Carbon Dioxide Pipeline will not prevent the modification of flow controls in the future.
Working with Physical Form and Function	Modify channel	The Newbuild Carbon Dioxide Pipeline will be buried at least 1.2m below the bed of the Dee. The pipe will be laid using trenchless methods and so the channel would not be modified.
Working with Physical Form and Function	Removal obsolete structures	The Newbuild Carbon Dioxide Pipeline will be buried at least 1.2m below the bed of the Dee. There will be no change to structures within the Dee and the Newbuild Carbon Dioxide Pipeline will not prevent the removal of structures in the future.

Table 5.18: Mitigation measures in place or not yet identified within the Sandycroft Drain water body

Category	Measure	Justification
Education	Educate landowners	The DCO Proposed Development would not prevent this mitigation measure from being implemented.
Operations and Maintenance	Selective vegetation control	Some vegetation removal would occur within the water body. It is anticipated that the structure of the riparian zone would be reinstated within two years of the construction works and there would be no long-term impact to the vegetation within this water body. The DCO Proposed
Operations and Maintenance	Vegetation control	

Category	Measure	Justification
Operations and Maintenance	Vegetation control timing	Development would not prevent further vegetation control from taking place.
Operations and Maintenance	Invasive species techniques	Invasive Non-native species (INNS) would be controlled during the construction works. The buried Newbuild Carbon Dioxide Pipeline would not impact the future control of INNS.
Operations and Maintenance	Retain habitats	Some riparian habitat would be temporarily impacted within the water body. The riparian habitat of watercourses subject to open cut methods is limited in value and is likely to recover within two years of the Construction Stage. The Newbuild Carbon Dioxide Pipeline will be below ground and would not permanently remove habitat.
Operations and Maintenance	Water level management	The Newbuild Carbon Dioxide Pipeline will be buried 1.2m below bed level of watercourses and therefore would not impact water levels.
Structural Modification	Enhance ecology	The Newbuild Carbon Dioxide Pipeline will be buried and therefore would not adversely impact ecology long-term. Future enhancement would be possible.
Structural Modification	Changes to locks etc	No changes to locks or other structures are proposed as part of the DCO Proposed Development.
Working with Physical Form and Function	Flood bunds	No changes to flood bunds are proposed as part of the DCO Proposed Development.
Working with Physical Form and Function	Remove or soften hard bank	The Newbuild Carbon Dioxide Pipeline would be buried 1.2m below bed level and therefore future bank improvements would not be prevented by the Newbuild Carbon Dioxide Pipeline.

Category	Measure	Justification
Working with Physical Form and Function	Preserve or restore habitats	The Newbuild Carbon Dioxide Pipeline would be buried 1.2m below bed level and therefore future habitat restoration would not be prevented by the Newbuild Carbon Dioxide Pipeline.
Working with Physical Form and Function	In-channel morph diversity	The Newbuild Carbon Dioxide Pipeline would be buried 1.2m below bed level and therefore improvements to channel morphology would not be prevented by the Newbuild Carbon Dioxide Pipeline.
Working with Physical Form and Function	Alter culvert channel bed	There are no changes to existing culverts proposed as part of the DCO Proposed Development.

5.4. STEP 4: ASSESSMENT OF THE DCO PROPOSED DEVELOPMENT AGAINST WFD OBJECTIVES - ENGLAND

5.4.1. The compliance of the DCO Proposed Development is determined based on an assessment against the following objectives discussed below considering biological, physico-chemical and hydromorphological quality elements for each water body assessed within the England leg of the DCO Proposed Development.

DOES THE DCO PROPOSED DEVELOPMENT CAUSE DETERIORATION IN THE ECOLOGICAL POTENTIAL OR STATUS OF A BODY OF SURFACE OR GROUNDWATER?

Peckmill Brook, Hoolpool gutter and Ince Marshes (GB112068060330)

5.4.2. The construction and operation Stages of the proposed Newbuild Carbon Dioxide Pipeline, and AGIs within this water body are not expected to cause long-lasting disturbance to the biological, physico-chemical or hydro-morphological quality elements or overall status due to the size, location, and nature of the works. In addition, no further deterioration is expected in the current and potential status of these quality elements of the water body, if the mitigation outlined in the CEMP and REAC is implemented. In addition, enhancements are proposed to improve riparian habitat in the vicinity of the Ince AGI.

Mersey Transitional (GB531206908100)

5.4.3. The proposed works will not be undertaken within the Mersey Transitional water body, and no significant impacts are expected within the upstream area (i.e., Gowy (Milton Brook to Mersey). No long-lasting disturbance is expected and, therefore, no deterioration in the biological, physico-chemical or hydro-morphological quality elements or overall status of the water body is expected.

Gowy (Milton Brook to Mersey) (GB112068060250)

5.4.4. The construction and operation Stages of the proposed Newbuild Carbon Dioxide Pipeline within this water body are not expected to cause long-lasting disturbance to the biological, physico-chemical or hydromorphological quality elements or overall status due to the size, location, and nature of the works. In addition, no further deterioration is expected in the current and potential status of the physico-chemical elements of the water body, if the mitigation outlined in the CEMP and REAC is implemented.

Stanney Mill Brook(GB112068060260)

5.4.5. The construction and operation Stages of the proposed Newbuild Carbon Dioxide Pipeline within this water body are not expected to cause long-lasting disturbance to the biological, physico-chemical or hydromorphological quality elements or overall status due to the size, location, and nature of the works. In addition, no further deterioration is expected in the current and potential status of the physico-chemical elements of the water body, if the mitigation outlined in the CEMP and REAC is implemented.

Shropshire Union Canal (GB71210133)

5.4.6. Trenchless crossings are proposed within this water body therefore the Construction Stage would have minimal environmental impacts to this water body. No impacts are anticipated during operation. Therefore, the DCO Proposed Development is not anticipated to cause deterioration in the biological, physico-chemical or hydromorphological quality elements or overall status with mitigation outlined in the CEMP and REAC being implemented.

Manchester Ship Canal (GB71210004)

5.4.7. Given that the works will not be undertaken within the Manchester Ship Canal, and no significant impacts are expected within the upstream area (i.e., Peckmill Brook). No long-lasting disturbance is expected and, therefore, no deterioration in the biological, physico-chemical or hydromorphological quality elements or overall status of the water body is expected.

Finchetts Gutter (GB111067056930)

5.4.8. The construction and operation Stages of the proposed Newbuild Carbon Dioxide Pipeline are not anticipated to cause long-lasting disturbance. Therefore, no deterioration in the biological, physico-chemical or hydro-morphological quality elements or overall status of the water body is expected with mitigation outlined in the CEMP and REAC being implemented.

5.4.9. In addition, there will be riparian planting on the watercourses which would see a greater loss of mature vegetation due to the open cut crossing and the 10m planting buffer for trees along the Newbuild Carbon Dioxide Pipeline. This will be in addition to the vegetation being reinstated after the open cut crossing. Enhancements are proposed on the Finchetts Gutter Tributary, Backford Brook and Friars Park Ditch (**D-WR-062 of the REAC, Document reference:D.6.5.1**).

Garden City Drain (GB111067056960)

5.4.10. The construction and operation Stages of the proposed Newbuild Carbon Dioxide Pipeline are not anticipated to cause long-lasting disturbance. Therefore, no deterioration in the biological, physico-chemical or hydromorphological quality elements or overall status of the water body is expected with mitigation outlined in the CEMP and REAC being implemented.

Sandycroft Drain (GB111067052160)

5.4.11. The construction and Operation Stages of the proposed Newbuild Carbon Dioxide Pipeline are not anticipated to cause long-lasting disturbance. Therefore, no deterioration in the biological, physico-chemical or hydro-morphological quality elements or overall status of the water body is expected with mitigation outlined in the CEMP and REAC being implemented.

Groundwater WFD water bodies

5.4.12. Groundwater was scoped out of the detailed assessment due to no impacts being anticipated at the water body scale. A WFDa summary is however provided for completeness below for the Wirral and West Cheshire Permo-Triassic Sandstone Aquifers (GB41101G202600) groundwater WFD water body.

Quantitative

5.4.13. No deterioration is expected in the current and potential status of the quantitative elements if the mitigation outlined in the CEMP, REAC and GWMMP are implemented.

Qualitative

5.4.14. No deterioration is expected in the current and potential status of the qualitative elements if the mitigation outlined in the CEMP, REAC and GWMMP are implemented.

DOES THE DCO PROPOSED DEVELOPMENT COMPROMISE THE ABILITY OF THE WATER BODY TO ACHIEVE GOOD ECOLOGICAL STATUS OR POTENTIAL?

5.4.15. Impacts would be predominantly limited to the Construction Stage of the DCO Proposed Development and therefore temporary in nature. Habitats would be reinstated as far as practicable to replicate baseline conditions. Habitats are expected to naturally recover within two years following reinstatement and therefore no long term impact anticipated.

5.4.16. Where tree removal is required along watercourses in the riparian zone for both enabling and construction works, trees would be replaced in accordance with the scheme wide tree planting strategy. In addition, where removal of trees is required along watercourses, enhancements are proposed to the riparian zone in accordance with the **LEMP (Document reference: D.6.5.5)** to ensure no significant impact to structure of the riparian zone for these watercourses. The loss of, replacement and enhancement of trees in the riparian zone is mainly within the Finchetts Gutter water body.

5.4.17. The Environment Agency has set a WFD Mitigation Measure to set back the existing flood embankments along the River Gowy to assist this water body in achieving its WFD objectives. Therefore, at the River Gowy crossing, the Newbuild Carbon Dioxide Pipeline would be buried at the design depth below river bed level for a wide enough distance across the valley floor to enable the re-naturalisation of the planform to its previous sinuous channel without risking exposure of the Newbuild Carbon Dioxide Pipeline by fluvial processes (**D-WR-055 of the REAC, Document reference:D.6.5.1**)

5.4.18. By allowing for the future planform change of the River Gowy, the DCO Proposed Development would not prevent the achievement of good status or potential.

5.4.19. The DCO Proposed Development therefore would not compromise the ability of the water bodies potentially impacted to achieve Good Ecological Potential/Status.

Groundwater WFD water bodies

5.4.20. Given that no long-lasting disturbance is expected, the DCO Proposed Development would not compromise the ability of the water bodies potentially impacted to achieve Good Ecological Potential/Status.

DOES THE DCO PROPOSED DEVELOPMENT CAUSE A PERMANENT EXCLUSION OR COMPROMISE ACHIEVEMENT OF THE WFD OBJECTIVES (E.G., MITIGATION MEASURES) IN OTHER WATER BODIES WITHIN THE SAME RBD?

5.4.21. The nature and dimensions of the proposed works to be conducted are limited primarily to the Construction Stage and not expected to propagate an impact on the WFD objectives of other water bodies within the same RBD.

DOES THE DCO PROPOSED DEVELOPMENT CONTRIBUTE TO THE DELIVERY OF THE WFD OBJECTIVES (E.G., MITIGATION MEASURES)?

5.4.22. The DCO Proposed Development does not contribute directly to the WFD objectives, but it is environmentally significant to reduce carbon emission in the UK.

5.4.23. Consideration of WFD mitigation Measures has been given in the design process so as not to prevent the achievement of those measures.

5.5. STEP 4: ASSESSMENT OF THE DCO PROPOSED DEVELOPMENT AGAINST WFD OBJECTIVES - WALES

5.5.1. The compliance of the DCO Proposed Development is determined based on an assessment against the following objectives discussed below considering biological, physico-chemical and hydromorphological quality elements for each water body assessed within the Wales leg of the DCO Proposed Development.

DOES THE DCO PROPOSED DEVELOPMENT CAUSE DETERIORATION IN THE ECOLOGICAL POTENTIAL OR STATUS OF A BODY OF SURFACE OR GROUNDWATER?

Wepre Brook (GB111067056880)

5.5.2. The construction and operation Stages of the proposed Newbuild Carbon Dioxide Pipeline would have a permanent and localised impact on the Alltami Brook due to the replacement of bedrock with likely a mixture of artificial and natural material resulting from an open cut crossing.

5.5.3. The replacement of bedrock with artificial material on Alltami Brook could have an impact on fish spawning habitat and fish migration. Fish migration upstream is however unlikely due to the A55 culvert which appears to be impassable to fish. A reduction in fish spawning habitat may result in a decline in fish population unless replacement habitat is provided. Replacement gravel-spawning habitat would be explored during the Detailed Design phase as part of the bespoke geomorphological assessment to mitigate this potential impact. Furthermore, ongoing monitoring of the permanent works at Alltami Brook will occur so that it can be determined if adaptive mitigation is required to prevent the deterioration of WFD status in the future (**D-WR-064, D-WR-065 and D-WR-066 of the REAC, Document reference:D.6.5.1**)

5.5.4. The enabling and construction works would also require removal of the mature trees and bank reprofiling on the Alltami Brook. The banks and vegetation cover would be reinstated to mimic baseline conditions as far as practicable post-construction (**D-WR-047 of the REAC, Document reference:D.6.5.1**).

5.5.5. At the Alltami Brook, the made ground in the vicinity of the proposed Newbuild Carbon Dioxide Pipeline crossing lies above the former sinuous planform of the watercourse. The Construction Contractor will undertake further consultation with Natural Resources Wales and the Lead Local Flood Authority Planning and Geomorphology Technical Specialists to determine the appropriate depth and extent of the pipeline placement so as not to prevent the future re-naturalisation of the Alltami Brook to a sinuous planform. (**D-WR-056 of the REAC, Document reference: D.6.5.1**).

5.5.6. The potential impacts from proposed activities on the Wepre Brook watercourse are not anticipated to have long-lasting disturbance. Habitats would be reinstated post-construction and are likely to recover within two years. Therefore, no long term effects on the water body are anticipated.

5.5.7. Overall, potential construction and operation impacts are unlikely to cause a deterioration in the status of quality elements or overall status at the Wepre Brook water body scale with the mitigation within the CEMP, REAC and monitoring measures implemented.

Swinchiard Brook (GB111067056940)

5.5.8. The Construction and Operation Stages of drainage network and outfalls is not expected to cause long-lasting disturbance or deterioration in the biological, physico-chemical or hydromorphological quality elements or overall status of the water body with the mitigation outlined in the CEMP being implemented.

Dee (North Wales) (GB531106708200)

5.5.9. Given that the works will not be undertaken within the Dee (North Wales) Transitional water body, no long-lasting disturbance is expected within the Dee (North Wales) transitional water body. Therefore, no deterioration in the biological, physico-chemical or hydromorphological quality elements or overall status of the water body is expected with the mitigation outlined in the CEMP being implemented.

Wheeler – Lower (GB110066059930)

5.5.10. The Construction and Operation Stages of the proposed block valves do not cause long-lasting disturbance on the WFD quality elements or status. Therefore, no deterioration in the biological, physico-chemical or hydromorphological quality elements or overall status of the water body is expected with the mitigation outlined in the CEMP being implemented.

Pant-Gwyn (GB110066059940)

5.5.11. The Construction and Operation Stages of the proposed block valves do not cause long-lasting disturbance on the WFD quality elements or status. Therefore, no deterioration in the biological, physico-chemical or hydromorphological quality elements or overall status of the water body is expected with the mitigation outlined in the CEMP being implemented.

Groundwater WFD water bodies

5.5.12. Groundwater was scoped out of the detailed assessment due to no impacts being anticipated at the water body scale. A WFD assessment summary is however provided for completeness below for the following groundwater WFD water bodies: Dee Permo-Triassic Sandstone (GB41101G202400); Dee Carboniferous Coal Measures (GB1102G204800); and Clwyd Carboniferous Limestone (GB41001G200300).

Quantitative

5.5.13. No deterioration is expected in the current and potential status of the quantitative elements if the mitigation outlined in the CEMP and GWMMP are implemented.

Qualitative

5.5.14. No deterioration is expected in the current and potential status of the qualitative elements if the mitigation outlined in the CEMP and GWMMP are implemented

DOES THE DCO PROPOSED DEVELOPMENT COMPROMISE THE ABILITY OF THE WATER BODY TO ACHIEVE GOOD ECOLOGICAL STATUS OR POTENTIAL?

5.5.15. Impacts would be predominantly limited to the Construction Stage of the DCO Proposed Development and therefore temporary in nature. Habitats would be reinstated as far as practicable to replicate baseline conditions. Habitats are expected to naturally recover within two years following reinstatement and therefore no long term impact anticipated.

5.5.16. Where tree removal is required along watercourses in the riparian zone for both enabling and construction works, trees would be replaced in accordance with the scheme wide tree planting strategy. Where mature riparian vegetation is removed near Friars Park Ditch, Backford Brook and Finchetts Gutter Tributary, riparian vegetation will be planted in addition to the vegetation planted for the reinstatement of the open cut. This vegetation will be a mix of riparian species and trees where practicable (**D-WR-047 and D-WR-063 of the REAC, Document reference: D.6.5.1**)

5.5.17. At Alltami Brook, there would be permanent loss of river bed habitat due to the open cut through bedrock and replacement with artificial material. The enabling and construction works would also require removal of the mature trees and bank reprofiling. The banks and vegetation cover would be reinstated to mimic baseline conditions as far as practicable post-construction. The replacement of bedrock with artificial material would have a localised impact but future failure could affect fish spawning habitat and migration. Fish migration upstream is however unlikely due to the A55 culvert, which appears to be impassable to fish. The length of bedrock removed from the channel will be at most 4m which is significantly smaller than the watercourse within the Wepre Brook water body. Ongoing monitoring of the permanent works will be carried out so that adaptive mitigation can be implemented to prevent the permanent works from affecting the water body's ability to reach good ecological status (**D-WR-063 and D-WR-065 of the REAC, Document reference: D.6.5.1)**.

5.5.18. At the Alltami Brook, the made ground in the vicinity of the proposed Newbuild Carbon Dioxide Pipeline crossing lies above the former sinuous planform of the watercourse. The Construction Contractor will undertake further consultation with Natural Resources Wales and the Lead Local Flood Authority Planning and Geomorphology Technical Specialists to determine the appropriate depth and extent of the pipeline placement so as not to prevent the future re-naturalisation of the Alltami Brook to a sinuous planform (**D-WR-056 of the REAC, Document reference: D.6.5.1)**.

5.5.19. By allowing for the future planform change of the Alltami Brook, the DCO Proposed Development would not prevent the achievement of good status or potential.

5.5.20. The DCO Proposed Development therefore would not compromise the ability of the water bodies potentially impacted to achieve Good Ecological Potential/Status.

Groundwater WFD water bodies

5.5.21. Given that no long-lasting disturbance is expected, the DCO Proposed Development would not compromise the ability of the water bodies potentially impacted to achieve Good Ecological Potential/Status.

DOES THE DCO PROPOSED DEVELOPMENT CAUSE A PERMANENT EXCLUSION OR COMPROMISE ACHIEVEMENT OF THE WFD OBJECTIVES (E.G., MITIGATION MEASURES) IN OTHER WATER BODIES WITHIN THE SAME RBD?

5.5.22. The nature and dimensions of the proposed works to be conducted are limited primarily to the Construction Stage and not expected to propagate an impact on the WFD objectives of other water bodies within the same RBD.

DOES THE DCO PROPOSED DEVELOPMENT CONTRIBUTE TO THE DELIVERY OF THE WFD OBJECTIVES (E.G., MITIGATION MEASURES)?

5.5.23. The DCO Proposed Development does not contribute directly to the WFD objectives, but it is environmentally significant to reduce carbon emission in the UK.

5.5.24. Consideration of WFD mitigation Measures has been given in the design process so as not to prevent the achievement of those measures.

5.6. STEP 5: ASSESSMENT OF THE DCO PROPOSED DEVELOPMENT AGAINST OTHER EU LEGISLATION

5.6.1. Article 4.9 of the WFD requires that “Member States shall ensure that the application of the new provisions guarantees at least the same level of protection as the existing Community legislation”.

5.6.2. The Nitrates Directive is relevant to the assessment of new modifications. Any potential change in the nutrient dynamics due to the DCO Proposed Development is most likely due to changes in the sediment regime. No sources of nitrates would be introduced to the water body as part of the DCO Proposed Development. Therefore, no separate assessment is required for nitrates.

5.6.3. The Freshwater Fish Directive was originally adopted in 1978 and was consolidated in 2006, then repealed in 2013. Therefore, no separate assessment is required for fish and the DCO Proposed Development would be designed to mitigate impacts on fish.

6. CONSTRUCTION IMPACTS

6.1. POTENTIAL CONSTRUCTION IMPACTS

6.1.1. The construction period can be long and have the potential for medium- to long-term effects on the water environment. Therefore, it is important to consider potential construction impacts on the WFD quality elements, WFD mitigation measures and actions, and the overall WFD status. Further assessment may also be required at the Detailed Design stage.

6.1.2. Effective mitigation should be put in place to eliminate or reduce any potential construction impacts to the receiving water bodies. Construction impacts could also have long-reaching effects extending to other upstream and downstream water bodies, which also need to be considered within the assessment to reduce the risk of impacts to WFD receptors.

6.1.3. Furthermore, construction activities may have an adverse impact on fluvial geomorphological processes, which may consequently have knock-on effects to the hydromorphology, biological and physico-chemical quality elements.

6.1.4. Potential Environmental Risks include:

- Fuel and oil spillage resulting in contamination of watercourse;
- Contamination of watercourse with cement material;
- Contamination of watercourse with chemicals; and,
- Contamination of watercourse with sediments.

6.1.5. The release of potentially toxic compounds such as fuel, oils and chemicals could have a significant impact in the vicinity and downstream of the construction site. Measures need to be in place to prevent the accidental release of pollutants into the watercourse.

6.2. CONSTRUCTION MITIGATION

6.2.1. The objectives of the mitigation measures included in the **OCEMP (Document reference: D.6.5.4)** for the DCO Proposed Development and the REAC (**Document reference: D.6.5.1**) are to avoid/prevent, reduce or offset these construction impacts.

7. CONCLUSION

7.1.1. The majority of the potential impacts arising from the DCO Proposed Development would be during the Construction Stage. Consequently, those impacts would primarily be temporary and with only localised impacts.

7.1.2. New permanent structures would be set-back from watercourses, including outfalls, to avoid modifications to watercourses.

7.1.3. One of the objectives of the DCO Proposed Development is to reinstate habitats where practicable. Where watercourses and riparian vegetation would be impacted, they would be reinstated post-construction and most watercourses would recover within two years. The exception would be where mature tree cover in the riparian zone is removed. Therefore, riparian enhancements are proposed to mitigate those impacts. Riparian enhancements are proposed at:

- East Central Drain;
- Finchetts Gutter Tributary;
- Backford Brook;
- Friars Park Ditch; and
- Alltami Brook.

7.1.4. These riparian enhancements may result in improvement in the River Condition Score for those watercourses once the tree cover is established. In addition, gravel augmentation is proposed on the Alltami Brook to off-set the potential reduction in spawning habitat and introduction of artificial bed material.

7.1.5. Design and construction methods have been adopted where practicable to eliminate, reduce and mitigate potential impacts as far as practicable.

7.1.6. The DCO Proposed Development would not prevent the achievement of WFD mitigation measures set for the River Dee (North Wales) Transitional water body, Western Wales, Dee, and North West River Basin Management Plans.

7.1.7. The DCO Proposed Development has been assessed to have no impact on the Wirral and West Cheshire Permo-Triassic Sandstone Aquifers, the Dee Permo-Triassic Sandstone, the Dee Carboniferous Coal Measures and the Clwyd Carboniferous Limestone Groundwater WFD water bodies.

7.1.8. Construction impacts would be mitigated through best-practice measures set out in the CEMP, which would be produced by the appointed Construction Contractor at the Detailed Design phase, as well as additional measures in the REAC.

7.1.9. Therefore, it is concluded that with the proposed mitigation in place, the DCO Proposed Development is WFD compliant.

8. REFERENCES

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- **Ref. 2.14** – Gurnell, A.M., England, J., Scott, S.J., Shuker, L.J., Foster, I.D.L., Downs, P. J., Grabowski, R.C., Gurnell, D.J., Jeffries, R (2021). A Guide to Assessing River Condition Part of the Rivers and Streams Component of the Biodiversity Net Gain Metric. BM3.0 version: August 2021
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- **Ref. 2.16** – ISO 8689-2:2000. Water quality - Biological classification of rivers - Part 2: Guidance on the presentation of biological quality data from surveys of benthic macroinvertebrates (ISO 8689-2:2000). Available at: [redacted] Accessed at 05/07/2022.
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Annex A

MEETING NOTES

ANNEX A - MEETING NOTES

AGENDA & MEETING NOTES 1

PROJECT NUMBER	70070865	**MEETING DATE**	02 March 2022
PROJECT NAME	HyNet North West Carbon Dioxide Pipeline - DCO	**VENUE**	Teams
CLIENT	Progressive Energy	**RECORDED BY**	GK
MEETING SUBJECT	WFD and FRA – EA Consultation		

PRESENT	Frances Marlow (FM) (WSP), Georgie Kleinschmidt (WSP), Helen Parsons (WSP), Gabriel Solis (WSP), Vic Mohun (WSP), Luke Mitchell (WSP), Trevor Croft (PEL), Stephen Sayce (EA), Graham Todd (EA), Duncan Revell (EA)
APOLOGIES	Apologies
DISTRIBUTION	As above plus:
CONFIDENTIALITY	**Restricted**

ITEM	SUBJECT	ACTION	DUE
	Introductions		
	Agenda		
	GK provided summary of the Project and DCO		
	Stephen: Currently reviewing the PEIR. EA required to provide statutory response. Will charge for information beyond initial consultation as part of the PEIR. Will fall outside the statutory process. FM: Screening and scoping of WFD elements has not been included within the PEIR		

ITEM	SUBJECT	ACTION	DUE
	FM: Provided list of Main Rivers and WFD water bodies and WFD Groundwater bodies in the vicinity of the Order Limits. See slides attached to these minutes.		
	FM: Presented the screening of water bodies (see attached slides). FM: Explained works to smaller watercourses within the wider WFD water body will be assessed. Tributaries of the Mersey transitional waterbody will be assessed using surface water quality elements and summarised within the transitional water body section of the assessment. DR agreed with this approach. DR: Generally, agree with the screening conclusion. Main Rivers don't match with WFD water bodies. Stanney Main Drain also need to be assessed. FM: All Main Rivers and relevant ordinary watercourses will be assessed within each WFD catchment SS to confirm is Garden City Drain is in Wales or England. FM explained that the tributary of Garden City Drain, which is crossed by a trenched crossing, is located in England. FM: Groundwater team unable to conclude on screening whether groundwater bodies should be included. May be requesting further meeting about whether they should be screened in. DR and SS: Need to speak to EA groundwater team before providing comment. FM: Propose to do one WFD assessment for whole scheme, including England and Wales HP: Are EA happy with the approach to undertake one WFD assessment and send to both NRW and EA? DR: Yes happy with this approach	SS SS/DR	
	FM: Outlined activities involved in the DCO (See information on attached slides) FM: Still awaiting final design freeze information which may provide more detail about the temporary crossings.		

ITEM	SUBJECT	ACTION	DUE
	FM: Presented the screening exercise for the proposed activities. (See attached slides) HP: Asked for mitigation measures for all watercourses. Specifically asked for those proposed on the River Gowy and whether there are any plans to re-naturalise the floodplain and set the embankment further back. DR: Will send the mitigation measures for all relevant water bodies. There are plans on the Gowy to move the left bank embankment further back from the channel. The DCO Proposed Development would need to make sure it did not prevent this from occurring. DR to confirm plans for the Gowy. DR: Asked what the temporary crossings would be. FM: Unsure what the crossing type will be yet. Expecting Bailey Bridge for larger watercourses and culverts for smaller watercourses. SS: Only concern on the screening is excluding River Continuity for temporary watercourse crossings. Could be seeking to hold flow, so need to consider this too. Depends on final design. The EA also retains the no culvert policy but understands that temporary ones may be required for construction. Where possible, temporary crossings that span the watercourse without affecting the channel should be used. If culverts are required for temporary crossings, an assessment of effects would be needed. GT stated that modelling of temporary effects of culverts would not be required but the structures would need to be of appropriate capacity. A design process and optioneering would need to be presented along with justification for using culverts and not just due to cost. FM: Screening conclusion will be included in minutes as slide pack and EA can formally responded to scoping opinion. DR: Ince marshes drain towards the Ince pumping station operated by the EA. This pumps water into the Manchester Ship Canal. Therefore, this may need to be screened in for assessment, but water quality elements only (not morphological or biological).	DR DR FM	

ITEM	SUBJECT	ACTION	DUE
	DR: Necessary to consider screens on pumps for temporary diversions so that fish are not in danger. Size of screen will depend on species in the watercourse. There may be eels in the River Gowy. Small mesh size would therefore be required if eels are present and screens will then need monitoring for debris and its effect on efficiency throughout construction.		
	HP: Regarding biodiversity calculations and river condition, do the EA consider the reinstatement of the watercourse after the pipeline is laid as reinstatement, despite the bed having been disturbed? DR: If the pipe is laid and the bed is returned to as it was with no bed reinforcement then this is considered as reinstatement. TC: Pipeline to be 2m minimum below bed level for trenchless crossings. Part of current FEED activity. Design standards are deeper than 2m.		
	FM: Presented the proposed methodology for the WFD assessment (see attached slides). SS: Sediment sampling may be needed for land contamination risks FM: This will be picked up by the land contamination team but is not proposed for WFD.		
	FM: Presented the proposed approach to mitigation (see attached slides). DR: Why is the project not aiming for Biodiversity Net Gain(BNG)? TC: BNG is still under consideration, however no net loss is the minimum position currently HP: Is providing WFD mitigation to neutralise impacts acceptable or does the EA expect us to provide any improvements? DR: Ensure no deterioration to water bodies and that mitigation measures aren't impacted. The government announced that projects like this would be considered for providing BNG.	HP	

ITEM	SUBJECT	ACTION	DUE
	HP: Design team will need to know the mitigation measures proposed in the area as this may affect the pipeline depths. HP to inform wider project team of implications to design.		
	FM: Provided an overview of the flood risk areas near the DCO Proposed Development (see attached slides). Ince AGI is in the tidal floodplain according to the Mersey Tidal model received from the EA. Area is also benefitting from flood defences. Stanlow AGIs shown on map at partly flood zone 3. Model for Stanlow Refinery (based on River Gowy model) shows that it is not actually within FZ2 outline. Central compound has been located outside the floodplain at the River Gowy. Temporary compounds will be for the unguided auger boring works. VM: Which model should we rely on for Stanlow AGI, given the EA website and the previous FRA report on the Stanlow AGI show different levels of flood risk? GT: Unsure of details around this. Needs to be examined in FRA. Usually latest and up to date info best to go with, but there may be a caveat surrounding why the model hasn't been published yet. Just need to make sure that it's been done correctly. WSP to request the latest Gale Brook model from the EA. VM: Lots of modelling info requests put to EA, have been sent some files but can't work with a lot of them. Request some more refined data requests for those which we can't open/haven't received. Should this be redirected within the EA? SS: Send to normal address but cc SS in.	VM/GS VM/GS	
	VM: What is the expectation for presentation or format of FRA given linear nature of scheme, i.e., would it be suitable to assess all the trenchless crossing within a similar section and the AGIs and BVs separately? GT: as long as all covered, format less important. VM: Propose to capture main pipeline in one section, as impacts likely to be the same. The AGIs and BVS will be assessed individually in the same FRA.		

ITEM	SUBJECT	ACTION	DUE
	GT: Is a FCA being completed for Wales? Vic: Separate FCA is being completed for the Welsh leg of the DCO application. Currently undertaking separate consultation with NRW. GT: Ensure whatever format adopted complies with each separate country's legislation.		
	VM: Drainage design and strategy prepared by another consultant, would normally include in same report. Would it be sufficient to make reference to a separate document by the other designer? SS: This would appear reasonable, but also need to consult with the LLFA for their individual requirements. EA's principal interest is fluvial flood maps and tidal. SS: Areas known as having groundwater table – could be creating pathway, need to ensure that the design does not create pathways for flooding. VM: Anti-buoyancy measures will be included in the report. The detail design will need to ensure that groundwater information along the pipeline is taken into consideration to prevent groundwater flooding.		
	VM: Regarding flood risk activity permits (FRAPs), are the EA expecting one application for each watercourse or one application covering them all? GT: programming and sequencing needs to be considered. Think about how to progress it. EA don't have a preference. If there are elements which aren't going to change but want the certainty up front, could apply for those. Hold back on applications for less certain elements to avoid abortive work.		
	VM: Is it acceptable to submit an FRA limited to permanent works not temporary measures? GT: Make reference to temporary works, but detail of methodology is better covered off as part of FRAPs, due to later engagement with contractors. Planning and pre-planning doesn't necessarily need the temporary works.		

ITEM	SUBJECT	ACTION	DUE
	VM: Don't want to prescribe the temporary process without engaging with the contractor. SS: Will still need to make reference to construction impacts. VM: Construction impacts will still be included in ES chapter which the FRA will make reference to.		
	VM: The design life of AGIs and BVs is 25 years so what is the correct approach for climate change allowances? GT: Won't be much modelling done since last July when the climate change allowances updated. Existing models might encompass 25-year climate allowance. If not, might need some adaptation in modelling, e.g., manipulation of a stage/discharge graph. SS: Operational life might exceed that, so worth considering extension for safeguarding the design and ensuring future resilience.		
	VM: What would the flood risk vulnerability category for the scheme be? SS: Vulnerability of pipeline to be water compatible but if AGIs need hazardous substance consent it would be highly vulnerable.		
	FM: When applying for FRAP for temporary crossings, what will the EA need to see? GT: If there is a clear span structure, then everything is beyond limits of channel. The EA retain a no culverting policy in the construction phase. Want to ensure short term impacts are as minimal as possible. No dig methods may not necessarily require FRAPs and the guidance regarding this needs to be consulted by the designer/applicant FM: Does the EA expect hydraulic modelling of temporary pipes? GT: No, but would consult Duncan's team (WFD/biodiversity) as well. EA would want to ensure that the capacity of any structure is commensurate with the watercourse. The EA would want assurance that the capacity is correct. An		

ITEM	SUBJECT	ACTION	DUE
	optioneering exercise for why clear span crossings are not adopted would be appreciated. LM: Pipes/culverts will have aquatic ecology/mammal crossing implications.		
	FM: Does the EA have concerns about boring under earth embankments on River Gowy? GT: These are likely to be privately owned but maintained and inspected by EA. If going with the FRAP exemption for this activity there are specific criteria around no-dig techniques. If work can't meet standard then need to apply for a permit. EA would look at proximity of the excavated work areas to the embankments and ensure any construction in close proximity to defences has been well considered.		
	SS: If there is any change in personnel, will let WSP know.		

Next meeting

An invitation will be issued if an additional meeting is required.

AGENDA & MEETING NOTES 2

PROJECT NUMBER	70070865	**MEETING DATE**	14 March 2022
PROJECT NAME	HyNet North West Carbon Dioxide Pipeline - DCO	**VENUE**	Teams
CLIENT	Progressive Energy	**RECORDED BY**	WSP
MEETING SUBJECT	DCO and TCPA Flood Risk Consultation with NRW		

PRESENT	Vic Mohun (WSP), Rebecca Potts (WSP), Rachael Chambers (WSP), Christopher Jones (NRW), Rhys Hughes (NRW)
APOLOGIES	Apologies - Frances Marlow (FM) (WSP), Georgie Kleinschmidt (WSP),
DISTRIBUTION	As above plus: Quentin Bahlman (PEL), Trevor Croft (PEL), Lara Peter (WSP), Natalie Corless (WSP)
CONFIDENTIALITY	**Restricted**

ITEM	SUBJECT	ACTION	DUE
1	Introductions		
2.	RC provided summary of the project and DCO		
3.	VM: Provided summary of DCO pipeline in Wales and TCPA Point of Ayr Site. VM presented overview map of the study area, watercourse crossings and AGI/BVS locations.		

ITEM	SUBJECT	ACTION	DUE
3.1.	VM: Presented an overview of what an AGI/BVS is alongside the type of crossings that will be found along various sections of the pipelines. VM: Mentioned a summary of all watercourse crossings within an area of flooding risk from rivers, ordinary watercourses and surface water.		
4.	VM: Provided background information on the Wepre Brook/Alltami Brook above ground pipeline crossing.		
5.	VM: Enquired what freeboard would be recommended and whether a hydraulic model is needed to determine the design flood level of the proposed above ground pipeline. VM: Advised that there is currently no hydraulic model of this section of ordinary watercourse and if it would be acceptable to simply present the fact that the pipe would be located very high within the valley as part of the FCA submission. RH: Advised that a 600mm freeboard of the 100yr plus CC would be needed, however, there is a need to consult with the LLFA to confirm as this is an ordinary watercourse, but the advice is to extend the hydraulic model to cover the ordinary watercourse. RH: Also advised that the NRW would expect to see the output from the hydraulic model and design criteria as part of the FCA at the first submission given the scale and nature of this high-profile scheme. VM: Asked who will assess the model? Would it be LLFA or would it need to go through NRW? RH: Advised that with extending the model, WSP would have to check with the LLFA, but NRW would probably need to review too due to the large scale of this scheme. VM: Asked if there are any set criteria for how the pipe or its foundations either side of the riverbank should be set, any erosion control or anti scour measures? RH: Mentioned that given that it’s an ordinary watercourse the LLFA would need the lead and advise WSP on this. VM: Asked will we need a FRAP?	WSP WSP WSP	

ITEM	SUBJECT	ACTION	DUE
	RH: Said yes as it's above the watercourse WSP will need to submit a FRAP. With the Dee crossing this will also need a marine license. VM: Asked if they could share the guidance on this. RH: Said the guidance is on the NRW website and asked if are there any Open Cut crossings on a main river? OC crossings on a main river need a bespoke permit and OC crossings on other watercourses would require a FRAP as there are no exceptions	WSP RH	
6.	VM: Presented a summary of all works that are been carried out at the Point of Ayr site for the TCPA. VM: Queried if, as part of the TCPA application, there is the crossing of a main river will a FRAP need to be applied? RH: FRAPs will be required based on the construction methodology and the guidance available from the NRW.		
7.	VM: Listed the outstanding queries for the DCO and TCPA. RP: Mentioned that WSP have had some responses from NRW for the TCPA and DCO but none from DCWW as of yet. For the outstanding queries, NRW asset and planning team need to be contacted for further information. RH: Said eventually the email requests will reach the asset team and you will be able to get access to the info then. There is a pumping station on an embankment in Talacre, also a hydraulic model available for the POA one which should be able to inform your FCA. The River Dee also has one, Broughton Brook also has one, these can be retrieved to inform the FCAs. VM: Advised that the FCAs would cover the permanent works only and not the temporary or construction works and enquired if this would be acceptable. RH: Mentioned that the FCA needs to acknowledge the need for generic mitigation measures for managing flows during the construction phase as this would then need to be elaborated more within the CEMP.	WSP	

ITEM	SUBJECT	ACTION	DUE
	RH: Advised that NRW are about to raise concerns within the PEIR on the fact that some temporary compounds/construction areas are located within areas at flood risk/floodplains. VM: Asked in relation to the buried pipeline, would it be acceptable to assume in the FCA that the risk to the permanent works from sources e.g., tidal, fluvial, groundwater reservoir etc would be negligible? RH: Advised that this is acceptable but also to yes but need to acknowledge where the sites are in a flood risk area.		
7.1.	VM: Asked about the format of the FCA report, i.e., whether it would be suitable to have one FCA for all the proposals for the DCO in separate chapters and as there would otherwise be a lot of repetitions given the linear nature of the scheme. RH: Mentioned that this is acceptable.		
8.	VM: Asked if NRW can provide guidance on vulnerability classes RH: Advised that would generally be advised by the LPA/LLFA.		
9.	VM: Mentioned that surface water management and drainage strategy is prepared by other consultants and will not form part of the FCAs. RH: This is acceptable as long as reference is made within the FCA report of other documents.		
10.	RH: Advised that the NRW offer a pre-application advice service on FRAPs. Need for FRAPs for Ordinary watercourse crossings will need to be discussed with the LLFAs. RH: Confirmed that the report does not need to be bilingual.		
11.	AOB - none		

Next Meeting

An invitation will be issued if an additional meeting is required.

AGENDA AND MEETING NOTES 3

PROJECT NUMBER	70070865	**MEETING DATE**	25 May 2022
PROJECT NAME	CO2 Pipeline – DCO	**VENUE**	Teams
CLIENT	Eni / PEL	**RECORDED BY**	GK
MEETING SUBJECT	Alltami Brook crossing method		

PRESENT	Frances Marlow, Helena Parsons, Raffaela Cislaghi (Eni), Chiara Caserotti (NRW – Wrexham and Flintshire Env Team), Chris Jones (NRW)
APOLOGIES	Brendan O'flyn (Eni) and Helen Millband (NRW – Geomorphology)
DISTRIBUTION	As above plus: Declan Franklin-Losardo (WSP)
CONFIDENTIALITY	**Restricted**

ITEM	SUBJECT	ACTION	DUE
1.	Introductions		
2.	Brief summary of the HyNet Project		
3.	Brief summary of the DCO Proposed Development and how it fits into the wider Project		
4.	Alltami Brook (See accompanying slides) - Ordinary watercourse (at the point where the pipeline crosses it) - Part of Wepre Brook WFD waterbody - South of Connah's Quay - Deep ravine – area has Made Ground which was put in place possibly as part of A55 construction		

ITEM	SUBJECT	ACTION	DUE
	- Areas of bedrock in channel, cobbles, exposed boulders, dense woodland on left bank, trees on right bank before steep escarpment to right (area of Made Ground) - Upstream of RLB is a culvert with a step down from the apron to the natural channel bed. Gabion baskets line the bank (some of which are starting to fail) - Immediately downstream is a bedrock section, leaning trees and woody debris - PRoW on left bank - Pipeline could be anywhere in 50m width across the channel		
5.	Alltami Brook located in a complex area - Several crossing options have been considered - Pros and cons of each discussed with the design team Trenchless crossings not possible due to the deep valley, meaning HDD can't work at that depth. Also mining tunnels on right bank, means that issues associated with loss of fluid or control of directional drilling. Also potential risk of creating a pathway for contamination if come across old mine water during drilling. Auger boring would require a 15m deep excavation pit through bedrock. Culvert the brook, and bury pipe above the culvert. Advised not to be a suitable option (NRW has a 'no culvert' policy) + WFD and ecological concerns Pipeline as a bridge but operational and inspection and maintenance requirements. Visual implications. Alternative pipeline crossing location / route realignment. Alltami brook is similar for quite a distance. More risks with mines in other locations, and A55 constraint to the south (would have to be crossed twice, plus Ancient Woodland and quarries)	NRW request more detail about why alternative locations were not feasible. NRW seek further justification of why a pipe bridge is not feasible	1/6/22

ITEM	SUBJECT	ACTION	DUE
6.	Proposed crossing technique = open cut crossing - Excavate 6-8m below ground level. Lay pipe and replace. - Temporary culverting OR temporary dams and pumping before and after and then reinstatement - Cut bedrock, and replace with concrete and scour protection (designed at detailed design) - Concerns around BNG (loss of river units and natural bedrock). Looking to enhance watercourses elsewhere within the catchment. Less intrusive than other possible methods such as the culverted watercourse option. - WFD compliance – option complies with no-culvert policy. Scour protection would have to be implemented to avoid geomorphic impact – determined at detailed design - WFD compliance – need to show we won't prevent watercourse becoming natural in the future. Before the A55 was constructed, the river meandered but now it's been culverted and straightened. Pipeline has a design life of 25 years – propose that in the lifetime, this brook is not going to be reaching natural conditions due to A55.	NRW request more detail about why methods were chosen	1/6/22
6.	Mitigation - The Alltami Brook is in Fairly Good condition, so enhancement to good might be difficult given constraints - Are there any NRW schemes locally which could benefit from additional funding as a means to offset WFD/BNG impacts?	CJ – to discuss with colleagues. Management of scour? Ful response to WSP by week commencing 13 June.	13/6/22
7.	CC: The Alltami Brook is unlikely to have been straightened as a result of the A55. (Noted although		

ITEM	SUBJECT	ACTION	DUE
	historical mapping does indicate the made ground and channel straightening has occurred within the past 40 years and likely to have been at a similar time to the road construction). Also, 25 years is a long time – still need to be mindful of improvement within these timescales given that there is increasing pressure to be improving the condition of rivers and streams..		
8.	CJ: Has WSP been in discussion with FCC as LLFA? FM : FCC have been struggling with staff availability. Still not managed to have a meeting.		
9.	CJ: Why was a pipeline bridge ruled out? FM: Regular inspections and maintenance and safety risk. Preference for underground pipeline and not to have any exposed sections of pipeline		
10.	FM : Improvements on other watercourses within BNG? Would that satisfy for WFD mitigation? CJ : NRW don't tend to use BNG metrics. CJ would need to check this with colleague as well. HP: Stepwise approach – does work alongside BNG process. Eliminate issues within the design where possible. Where issues can't be designed out, then we provide mitigation.	CJ to check with colleagues around suitability of BNG metric for WFD mitigation	13/6/22
11.	CC: Outline the feasibility of different locations? E.g. crossing agricultural land? FM :Very similar upstream and have to avoid residential areas by a certain distance. Can cross south but would need to cross A55 twice and restricted by quarries and ancient woodland.		
12.	Other scheme design elements - Wepre Brook. Was trenchless but that will now be open cut. Less concerned about quality at this point. Not bedrock, so easier to reinstate bed at this location. Ordinary watercourse. - Little Lead Brook – outfall from AGI. Hopefully set back from watercourse. Ordinary watercourse.	Why was this changed to trenched? RC to find out.	1/6/22

ITEM	SUBJECT	ACTION	DUE
	- Broughton Brook and Sandycroft Drain = Main Rivers. Both trenchless crossings. Both fairly poor condition. CC: Pointed out that the Sandycroft pipeline location appears to be close to residential properties so does this mean crossing at Alltami Brook could be moved closer to residential properties?		
13.	NRW aiming for WC 13th June for responses.	WSP to confirm DCO Application date.	1/6/22

Next meeting

N/A

AGENDA & MEETING NOTES 4

PROJECT NUMBER	70070865	**MEETING DATE**	19 July 2022
PROJECT NAME	HyNet CO2 Pipeline DCO	**VENUE**	MS Teams
CLIENT	EPUK	**RECORDED BY**	FM
MEETING SUBJECT	Meeting subject		

PRESENT	NRW: Chris Jones (Planning Lead), Oliver Lowe (Geomorphology), Chiara Caserotti (Wrexham/Flints Environment Officer), Stefan Le Roy (Hydrogeology), Matthew Ellis (Ecology) Eni UK, together with EPUK: Dan Hooley, Axel Tanty, Raffaella Cislaghi PEL: James Glass WSP: Rachael Chambers , Declan Franklin-Losardo, Helena Parsons, Frances Marlow, David Chatterton, Luke Mitchell, Akshat Vipin
APOLOGIES	Apologies: George Nuttall (NRW)
DISTRIBUTION	As above
CONFIDENTIALITY	**Restricted**

ITEM	SUBJECT	ACTION	DUE
	JG: Set out the background to this meeting. Provided context with previous NRW meeting, comments and suggestions.		
	JG: Explained why the A55 culvert cannot be used. JG: Explained that CO2 pipeline is more significant than a 'traditional' pipeline/utility diversion. An image showed that the working width typically used for pipelines of a similar diameter to what is proposed (36inch). The pipeline would be approximately 8		

	tonnes per lifted pipe length, buried approx. 1.2m below ground level. The working width is therefore up to 32m so that these logistics can be accommodated. The approximate distance between the A55 and the existing Alltami Brook culvert is only approx. 12m. This would therefore require a closure of the Eastbound carriageway for 5-6months. This also assumes that it can be built within the artificial embankment of the road. The material of this embankment is unlikely to be suitable for a buried pipeline. Works to the A55 embankment would also risk compromising its function of supporting the road. Discounted due to scale and space but it would also be a difficult operation to ensure operation and safety of the road. Another constraint to this option is a high voltage overhead cable in this area which would be an expensive and complicated option to reroute.		
	CC: Asked if the working width would therefore mean that a 32m length of the Alltami Brook would be affected. JG explained that during construction phase, up to 32m width would likely be temporarily culverted with vegetation removed. However, this would be kept to the minimum practicable and only the width of the pipeline + 1m either side would be permanently affected. The temporary working width could potentially be reduced from up to 32m as there would not need to be top soil stored within the watercourse section. (post meeting note: WSP are assessing a 32m working width in the ES)		
	JG: Explained why a pipeline bridge is not a suitable option. Health and safety concerns regarding public climbing on the pipeline and falling. Pipe bridges have typically not been built for this size of pipe in the UK for a number of years.		

	It is general best practise to keep the pipeline buried to prevent health and safety incidents. Duty under CDM Regs to design-out known risks where there is a viable alternative. OL: Challenged that other utility providers still install pipeline bridges and this is the first case that OL has heard of this safety requirement being a reason to discount this approach. JG: Pointed out that this area is next to a wedding venue, residential area, PRoW and there are no manned facilities nearby. OL pointed out that the location was surrounded by field, houses are a distance away and the closest building was the wedding venue (not its sole use), which may only be used every other weekend and is a few hundred metres away, across fields from the site. OL: Would like to see further information to justify discounting pipe bridge due to public safety risk. If HSE can confirm this reason, then NRW will not be likey to object. JG: Explained that in the very rare event of a leak, pressurised CO_2 gas of -30°C would leave pipe and sit in the valley and cause a noxious atmosphere, impacting biodiversity and human health risk. For context, if a pipe was buried and it leaked, it would be contained below ground until it would blow a localised crater, land above would bowl and send CO2 upwards. JG: Stressed that this was a very rare event. JG: Confirmed that the pipe is delivered in 12m sections which are then welded together on site.	JG to provide H&S guidance / standards used.	29/07/22
	JG: Explained why HDD cannot be used to install the pipeline under the watercourse below ground level. Pipeline diameter and width can only bend a certain amount due to elastic radius of a steel pipe, so in this case the HDD crossing would be 450m in length to give 7m cover between pipeline and bed of the brook. JG showed the likely extent of this on the map and a		

	photograph to provide context from another project in Canada. HDD was considered at feasibility stage and was discounted due to physical constraints. HDD would also route the works through shallow coal measures (there have been extensive past coal mining works in the area with some historical records shown on the presentation), where the ground conditions are fractured and the rock is weak. In order to accommodate the 36” diameter pipe, the hole made by the HDD rig would need to be 48” diameter. The hole would need to be 7m below bed level to prevent this impacting on the watercourse. In order to make the hole, high density, high pressure mud is forced through the gap and backreamed. If the drill meets a void, there is a risk that the drilling mud fluid would breakout, causing unknown environmental consequences. There is also a risk that a breakout could happen in the watercourse itself causing pollution. It is currently considered that the pipeline would go through two areas of coal mining works. However, Coal Mining Authority Records don’t exactly match the geophysical surveys, so there is a risk that these could be encountered elsewhere. Furthermore, the landowner also states that approximately three times more coal was removed than declared. Works in areas of coal mining have stability and pollution risk, including bentonite fracking polluting a wide area. OL: Thanks JG for the context provided for the HDD option.		
	CC: Asked if HDD could be done under the A55 JG: Explained that the pipeline cannot run parallel / under the road due to maintenance and H&S issues. This would also not avoid the coal mining risk. The A55 cannot be crossed twice (to bring the pipeline south). JG explained there were more coal		

	mining areas as well as an active quarry south of the A55. HDD causes long term settlement so if this is put under a road it could cause problems of settlement and impact the existing road for years into the future and cause further road closures. Highways Authority would not allow this.		
	JG: Explained cathodic protection to protect any scratched section of the pipeline from rust (by impressing free electrons into the pipeline). HDD method would likely scratch the coating on the pipe during installation, by virtue of the works involved. Through areas of historic coal mines, there is high ground conductivity, therefore the cathodic protection system would likely ‘short-circuit’ and may not be able to effectively protect the whole length of the crossing. As a result, within 5-10 years the pipeline may be non-operational and need replacing.		
	JG: Explained why auger-boring has been discounted. Boring would involve digging a trench as long as the pipe length to be buried (this needs to cover existing brook width and the historic meanders), at the required depth to be >1.2m below bed level. The trench would be as wide as necessary to be a safe excavation. Therefore, this would require significant earthworks. This is made more difficult through made ground (right bank) with potential for contaminated land and the risk of encountering historic coal mines.		
	OL: Pointed out that the auger boring pit would still be reasonably close to the river channel. OL: Asked how deep under the riverbed is the bedrock. JG explained that the riverbed is bedrock. OL: Stated that, in WFD terms, a high risk activity is anything with hard engineering of the river bed. OL provided an example: replacing gravel bed river with a concrete ford.		

	There have been some applications to modify bedrock on natural falls to enable fish passage, but they have all been refused as they would have set a dangerous precedent. OL noted that this project would be replacing bedrock with similar density (concrete) and elevation. OL: Asked about the bank side material. DH: Confirmed that the right bank has soft soils due to infill from the A55 construction. The left bank has less infilled material but had a historic railway line. The infill material has resulted in the straightening of the watercourse. OL: Asked if the project could look to restore some of the original sinuosity in the channel. JG: Recognised that a lot of the material would be removed anyway but it would have to be taken away with poor road infrastructure nearby. JG to look into this further.	JG to look at feasibility to increase sinuosity through this reach	29/07/22
	JG: Questioned if NRW would allow open cut method at all? If not allowed then auger boring could be adopted. However, it is important to consider that due to the location and existing conditions, auger bore method would have other environmental impacts. There would also be a notable difference in construction duration between the methods - Open cut would be approximately 3 weeks work, whereas auger boring would take approximately 5-6 months. OL: Commented that the difference of environmental impact on the riparian zone between open cut and auger bore is not that significant OL: To discuss within NRW and confirm if open cut crossing would be acceptable. JG: Confirmed there would be up to approximately 3m depth of bedrock removal to install the pipeline through an open cut method. OL: Commented that the best option for NRW (i.e. from an environmental perspective) is likely to be the	NRW to advise on the options presented.	29/07/22

	open span pipeline. NRW request more information on why this is not an acceptable method. Post-meeting note from NRW: in its advisory role as a statutory consultee to the DCO process, it is not for NRW to 'allow' proposals or otherwise – this decision would be for the Examining Authority, in consideration of NRW's advice along with the views of the applicant and other interested parties. Post-meeting note from NRW: NRW is unable to determine this with the information currently available and is not in a position to pre-determine the assessment. When consulted on the DCO submission by the Examining Authority we would review the full information submitted and provide our advice accordingly.		
	CC: Asked if other route options for the crossing have been considered. JG: Confirmed a feasibility study has considered many route alignments. The longer the pipeline becomes there are more stakeholders and the DCO process has compulsory purchase powers – therefore longer routes would impact more landowners, as well as other potential constraints. AV: Confirmed that the DCO application will include an options assessment to be presented in the ES, which considers the alternative routes including a route south of A55. CC: Asked if the optioneering considered routing the pipeline along the road north of this location (through Northop Hall). JG: Explained that this would require the road (north of this location) to be closed for approximately 1 year and would be difficult to justify when there are other viable options that are away from residential dwellings and do not impact them, in fields and are shorter. There is also limited working width along the road. DH added that the Brook is still incised at this location. Bridge is masonry arched.		

	ME: Advised to minimize impact on woodland communities (particularly Annex 1 woodland and protected species). ME: Also enquired whether adjoining areas of Annex I woodland could be legally secured and appropriately managed as an enhancement measure. It was suggested that this may be worth pursuing with the Local Planning Authority's ecologist. JG: Confirmed that avoiding and/or minimising impact on woodland has been integral to the design development.		
	HP: Clarified that permanent easement is 24m which would have restrictions on vegetation replanting, to avoid impacting the pipe and any requirement for maintenance/repair access. If the brook is crossed via open cut, there would be loss of trees on the bank of the brook for a 32m section. Trees cannot be replanted within 24m around the pipe (only hedgerows and scrub) but can be replanted outside of this easement. HP: Asked ME to consider this in his advice OL: Asked if pipe was bridged could trees be planted nearer? JG: Clarified that clear span and the embankment required would likely lead to more vegetation loss. For auger boring option, trees on banks would be retained. But trees further away may be lost as this would require more earthworks on the south bank (closing Pinfold Lane).	ME	
	HP: Asked if project team could get an opinion on WFD compliance from NRW CJ: To take information away and provide NRW's response outside of the meeting. Asked JG provide information on which standards/regulations pertain to limiting the use of the open span crossing option	CJ to respond to queries regarding Alltami Brook crossing method	29/07/22
	FM: Asked if flood modelling would be required for the clear span option.	CJ to discuss constraints with	

	CJ: Will speak to flood colleagues to confirm outside of the meeting OL: Commented it will need to be considered but not likely to be a constraint due to the upstream constriction at the existing A55 culvert.	flood risk colleagues	29/07/22
	SLR: Asked if any options appraisals have been prepared on the various construction methods for this with more detail. JG: Confirmed only internal options review paper has been completed for Alltami Brook. More detail has not been completed because of the involvement needed from contractors. Design development has been collaborative between engineering and environmental factors – a detailed options appraisal considering all temporary and permanent works for every crossing has not been undertaken. SLR: Asked how long it would take to complete? JG: Confirmed several months as there are a limited number of contractors with the capability/equipment to appraise all methods. It could be done by the main works contractor at a later stage. Contractor information would be useful but not possible within the intended submission programme. CC: Commented that NRW could be criticised if it didn't ask about other options SLR: Commented that options to be reviewed based on time/cost vs regulatory constraints. HP: Commented that WSP need to understand chosen method to assess effectively in the ES. RC/AV explained that the EIA is assessing the worst case of the trenchless methods. But each crossing is assessed as either open cut or trenchless (and not assessed for both options) HP: Stated that project team need to know NRW's opinion regarding WFD compliance and mitigation requirements		
	AV: Confirmed the DCO submission is planned for late Q3 2022		

Next meeting

TBC.

Annex B

WFD SCOPING FOR COASTAL AND TRANSITIONAL WATER BODIES

ANNEX B - WFD SCOPING FOR COASTAL AND TRANSITIONAL WATER BODIES

HYDROMORPHOLOGY

Table B.1 assesses the potential impact of the DCO Proposed Development against the WFD hydromorphology receptors for the screened in surface water bodies.

Table B.1: WFD scoping of the DCO Proposed Development activities against WFD hydromorphology receptors for screened in surface water bodies (Mersey, Dee (N. Wales) and North Wales)

	Risk to receptor	Justification
Could the DCO Proposed Development impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status?	Mersey (GB531206908100)	
	No	Waterbody classified as Moderate
	Dee (N. Wales) (GB531106708200)	
	No	Waterbody classified as Moderate
	North Wales (GB641011650000)	
	No	Waterbody classified as Moderate
Could the DCO Proposed Development significantly impact the hydromorphology of any water body?	Mersey (GB531206908100)	
	No	The DCO Proposed Development activities are insignificant compared to area of the WFD water body. No impacts are expected from either the construction or operation phases of the DCO Proposed Development. The DCO Proposed Development is not expected to significantly impact the WFD objectives set for the water body.
	Dee (N. Wales) (GB531106708200)	
	No	The DCO Proposed Development activities are insignificant compared to area of the WFD water body. No impacts are expected from either the construction or operation phases of the DCO Proposed Development. The DCO Proposed Development is not expected to significantly impact the WFD objectives set for the water body.
	North Wales (GB641011650000)	
	No	The DCO Proposed Development activities are insignificant compared to area of the WFD water body. No impacts are expected from either the construction or operation phases of the DCO

	Risk to receptor	Justification
		Proposed Development. The DCO Proposed Development is not expected to significantly impact the WFD objectives set for the water body.
Is the DCO Proposed Development in a water body that is heavily modified for the same use as your activity?	Mersey (GB531206908100)	
	No	The water body is not designated as heavily modified due to pipeline infrastructure. Therefore, the DCO Proposed Development has a new function unrelated to the existing waterbody modification.
	Dee (N. Wales) (GB531106708200)	
	No	The water body is not designated as heavily modified due to pipeline infrastructure. Therefore, the DCO Proposed Development has a new function unrelated to the existing waterbody modification.
	North Wales (GB641011650000)	
	No	The water body is not designated as heavily modified due to pipeline infrastructure. Therefore, the DCO Proposed Development has a new function unrelated to the existing waterbody modification.

Table B.2 assesses the potential impacts of the DCO Proposed Development against the WFD biological receptors for the screened in surface water bodies.

The assessment against biological receptors requires consideration against the presence of higher and lower sensitivity habitats. The DCO Proposed Development could potentially impact upon:

Higher sensitivity habitats:

- Saltmarsh

Lower sensitivity habitats:

- Intertidal soft sediment; and,
- Rocky shore

Table B.2: WFD scoping of the DCO Proposed Development activities against WFD biological receptors for the screened in surface water bodies (Mersey, Dee (N. Wales) and North Wales)

	Risk to receptor	Justification
Is the footprint of the DCO Proposed Development $0.5km^2$ or larger?	Mersey (GB531206908100)	
	No	The footprint of the DCO Proposed Development is smaller than $0.5km^2$.
	Dee (N. Wales) (GB531106708200)	
	No	The footprint of the DCO Proposed Development is smaller than $0.5km^2$.
	North Wales (GB641011650000)	
	No	The footprint of the DCO Proposed Development is smaller than $0.5km^2$.
Is the footprint of the DCO Proposed Development 1% or more of the water body's area?	Mersey (GB531206908100)	
	No	The footprint of the DCO Proposed Development is less than 1% of the water body's area.
	Dee (N. Wales) (GB531106708200)	
	No	The footprint of the DCO Proposed Development is less than 1% of the water body's area.
	North Wales (GB641011650000)	
	No	The footprint of the DCO Proposed Development is less than 1% of the water body's area.
Is the footprint of the DCO Proposed Development within 500m of any higher sensitivity habitat?	Mersey (GB531206908100)	
	No	The DCO Proposed Development is not within 500m of any high sensitivity habitat present within the Mersey water body.
	Dee (N. Wales) (GB531106708200)	
	Yes	The footprint of DCO Proposed Development is within 500m of saltmarsh habitat.
	North Wales (GB641011650000)	
	No	The DCO Proposed Development is not within 500m of any high sensitivity habitat present within the North Wales water body.
Is the footprint of the DCO Proposed Development 1% or more of any lower sensitivity habitat?	Mersey (GB531206908100)	
	No	The footprint of the DCO Proposed Development will not exceed 1% of any lower sensitivity habitat within the Mersey water body.

	Risk to receptor	Justification
	Dee (N. Wales) (GB531106708200)	
	No	The DCO Proposed Development may impact rocky shore and intertidal soft sediment habitat, but the footprint will not exceed 1% of these lower sensitivity habitats. Therefore, it is concluded that there would be no risk to the receptor.
	North Wales (GB641011650000)	
	No	The footprint of the DCO Proposed Development will not exceed 1% of any lower sensitivity habitat within the North Wales water body.
Biology - Fish		
Is the DCO Proposed Development in an estuary and could it affect fish in and outside the estuary, could it delay or prevent fish entering it and could affect fish migrating through the estuary?	Mersey (GB531206908100)	
	No	The DCO Proposed Development activities are not within the estuary, and activity on hydrologically connected watercourses are insignificant compared to the size of the water body. Therefore, no significant impacts are expected to fish migration or movement.
	Dee (N. Wales) (GB531106708200)	
	Yes	The DCO Proposed Development includes a proposed crossing of a transitional section of the River Dee, which could impact fish within the estuary through vibration, noise and pollution.
	North Wales (GB641011650000)	
	No	The DCO Proposed Development activities are not within the estuary, and activity on hydrologically connected watercourses are insignificant compared to the size of the water body. Therefore, no significant impacts are expected to fish migration or movement.
Could the DCO Proposed Development impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)?	Mersey (GB531206908100)	
	No	The DCO Proposed Development activities are not within the estuary, and activity on hydrologically connected watercourses are expected to be short-term and localised, and consequently are insignificant compared to the size of the

	Risk to receptor	Justification
		water body. Therefore, no significant impacts are expected to fish behaviour.
	Dee (N. Wales) (GB531106708200)	
	Yes	The DCO Proposed Development construction activities could create vibration, noise and pollution that could impact the behaviour of fish within the waterbody
	North Wales (GB641011650000)	
	No	The DCO Proposed Development will not have any direct significant impact on this water body, or any hydrologically connected watercourses.
Could the DCO Proposed Development cause entrainment or impingement of fish?	Mersey (GB531206908100)	
	Yes	The DCO Proposed Development is expected to include activities within the Mersey water body that could cause entrainment or impingement of fish. These activities are in watercourses that are hydrologically connected to the estuary, but not within the estuary itself.
	Dee (N. Wales) (GB531106708200)	
	Yes	The DCO Proposed Development is expected to include activities within the Dee water body that could cause entrainment or impingement of fish. These activities are in watercourses that are hydrologically connected to the estuary, but not within the estuary itself.
	North Wales (GB641011650000)	
	No	The DCO Proposed Development activities will not cause any entrainment or impingement of fish within this waterbody.

WATER QUALITY

Table B.3 assesses the potential impact of the DCO Proposed Development against the WFD water quality receptors for the screened in surface water bodies.

Table B.3: WFD scoping of the DCO Proposed Development activities against WFD water quality receptors for screened in surface water bodies (Mersey, Dee (N. Wales) and North Wales)

	Risk to receptor	Justification
Could the DCO Proposed Development affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)?	Mersey (GB531206908100)	
	No	Construction activities within the watercourse catchment have potential to release sediment into channel, affecting water clarity and nutrients. However, sediment release is unlikely to have a significant impact due to dilution of sediment within far larger water body area. The risk of sediment release would also be managed through the CEMP.
	Dee (N. Wales) (GB531106708200)	
	Yes	Construction activities within the watercourse catchment have potential to release sediment into channel, affecting water clarity and nutrients. However, sediment release is unlikely to have a significant impact due to dilution of sediment within far larger waterbody area. The risk of sediment release would also be managed through the CEMP.
	North Wales (GB641011650000)	
	No	The DCO Proposed Development is not within this WFD waterbody and due to distance of the water body to the proposed activities, no risk to these receptors is anticipated. .
Is the DCO Proposed Development in a water body with a history of harmful algae?	Mersey (GB531206908100)	
	No	No history of harmful algae
	Dee (N. Wales) (GB531106708200)	
	Yes	History of harmful algae
	North Wales (GB641011650000)	
	No	The DCO Proposed Development is not within this WFD water body and due to the distance of the water body to the proposed activities,, no risk to this receptor is anticipated.

	Risk to receptor	Justification
Is the DCO Proposed Development in a water body with a phytoplankton status of moderate, poor or bad?	Mersey (GB531206908100)	
	Yes	Moderate phytoplankton status
	Dee (N. Wales) (GB531106708200)	
	No	Good phytoplankton status
	North Wales (GB641011650000)	
	No	Moderate phytoplankton status. However, the DCO Proposed Development is not within this WFD water body so no adverse impacts are anticipated.
If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if the chemicals are on the Environmental Quality Standards Directive (EQSD) list.	Mersey (GB531206908100)	
	No	The latest chemical status of the water body is 'Fail', indicating high level of contaminants within sediments. However, any chemicals released are unlikely to have a significant impact due to dilution within the far larger water body area, and the risk from sediment disturbance would also be managed through the CEMP. Additionally, the use of chemicals on the EQSD list are not proposed for construction activities within the watercourse catchment.
	Dee (N. Wales) (GB531106708200)	
	No	The latest chemical status of the water body is 'Fail', indicating high level of contaminants within sediments. However, any chemicals released are unlikely to have a significant impact due to dilution within the far larger water body area, and the risk from sediment disturbance would also be managed through the CEMP. A trenchless crossing method (Horizontal Directional Drilling) will be used to cross the River Dee, with the pipeline installed 25m below bed level. This will lessen sediment disturbance and consequently reduce the risk of sediment bound chemicals being released into the water body. Additionally, the use of chemicals on the EQSD list are not proposed for

	Risk to receptor	Justification
		construction activities within the watercourse catchment.
	North Wales (GB641011650000)	
	No	The DCO Proposed Development is not within this WFD waterbody and due to distance of the water body to the proposed activities, no exposure to chemicals on the EQSD list is anticipated.
If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if it disturbs sediment with contaminants above Cefas Action Level 1.	Mersey (GB531206908100)	
	No	The quantity of contaminants above Cefas Action Level 1 in the local sediment is unknown. However, sediment disturbance is unlikely to have a significant impact due to dilution within the far larger water body area, and the risk of sediment release would also be managed through the CEMP.
	Dee (N. Wales) (GB531106708200)	
	No	The quantity of contaminants above Cefas Action Level 1 in the local sediment is unknown. However, sediment disturbance is unlikely to have a significant impact due to dilution within the far larger water body area, and the risk of sediment release would also be managed through the CEMP. Moreover, a trenchless crossing method (Horizontal Directional Drilling) will be used to cross the River Dee, with the pipeline installed 25m below bed level. This will lessen sediment disturbance and consequently reduce the risk of sediment bound chemicals being released into the water body.
	North Wales (GB641011650000)	
	No	The DCO Proposed Development is not within this WFD waterbody and due to distance of the water body to the proposed activities, no exposure to contaminants above Cefas Action Level 1 is anticipated.
	Mersey (GB531206908100)	

	Risk to receptor	Justification
If your activity has a mixing zone (like a discharge pipeline or outfall) consider if the chemicals released are on the Environmental Quality Standards Directive (EQSD) list.	No	Use of chemicals on the EQSD list are not proposed for construction activities within the watercourse catchment.
	Dee (N. Wales) (GB531106708200)	
	No	Use of chemicals on the EQSD list are not proposed for construction activities within the watercourse catchment.
	North Wales (GB641011650000)	
	No	The DCO Proposed Development is not within this WFD waterbody and due to distance of the water body to the proposed activities, no exposure to chemicals on the EQSD list is anticipated.

PROTECTED AREAS AND INNS

Table B.4 assesses the potential impact of the DCO Proposed Development against the WFD Protected Areas and INNS receptors for the screened in surface water bodies.

Table B.4: WFD scoping of the DCO Proposed Development activities against WFD Protected Areas and INNS for screened in surface water bodies (Mersey, Dee (N. Wales) and North Wales)

Consider if the Activity may Impact Protected Areas or INNS:	Risk to Receptor (Yes/No)	Justification
Is the DCO Proposed Development within 2km of any WFD protected area?	Yes	DCO Proposed Development within 2km of Mersey Estuary SPA; Dee Estuary SAC, SPA and SSSI
Could the DCO Proposed Development introduce or spread INNS?	Yes	DCO Proposed Development activities could spread INNS that are present in watercourses and estuaries.

Annex C

BASELINE INFORMATION

ANNEX C - BASELINE INFORMATION

EAST CENTRAL DRAIN

Baseline data for East Central Drain

Watercourse name	East Central Drain
	Water feature type: Main River Catchment area: 1.02km^2 Key hydraulic connections: Flows into West Central Drain Surrounding land use: Mostly pastural fields with stands of plantation woodland and an industrial estate. Access tracks and paved roads are present. River Condition Score: Moderate
Catchment Characteristics	The catchment mostly comprises grassland with some arable and horticultural land uses. A smaller proportion of the catchment has built-up land use and woodland. The catchment has an elevation between 4.9 - 40mAOD).
Catchment Geology and Soils	The bedrock geology comprises Kinnerton sandstone formation (sandstone). The East Central Drain is underlain by superficial

Watercourse name	East Central Drain
	deposits of clay, silt and sand, formed from tidal flat deposits at the Quaternary shoreline. The catchment features loamy and sandy soils with naturally high groundwater and a peaty surface. These soils drain well into local shallow groundwater. These soils are vulnerable to pollution from nutrients, pesticides and wastes applied to the land.
Catchment Hydrology	The East Central Drain drains the adjacent farmland. The watercourse is ungauged.
Historical Channel Change	The East Central Drain has provided drainage for the Ince Marshes since at least 1885. The catchment consists of cut drainage ditches for the local farmland. The East Central Drain has maintained a similar planform since 1885 to the present day. Between 1970 and 1985 an industrial estate was constructed for the production of fertilisers. Through time, sections of the East Central Drain, west of the industrial estate, have been straightened and realigned. Between 1968- 1975, the M56 was constructed and created a division within the catchment. Culverts run under the M56 ensuring onward continuity of flows.
Biological	

Watercourse name	East Central Drain
Fish	Scoped out as the watercourse will not be crossed by the pipeline. Runoff from the AGI will be treated and no additional flow volume is expected.
Invertebrates	Scoped out as the watercourse will not be crossed by the pipeline. Runoff from the AGI will be treated, and no additional flow volume is expected.
Macrophytes & Phytoplankton	Scoped out as the watercourse will not be crossed by the pipeline. Runoff from the AGI will be treated, and no additional flow volume is expected.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	

Watercourse name	East Central Drain
Quantity and Dynamics of Flow	Extensive smooth flows
River Continuity	There are some culverted sections under roads. The ditch is incised and not connected with the floodplain.
River Depth and Width Variation	The channel is a trapezoidal cut ditch with obviously reshaped earth banks. Water depth varies between 0.5 – 0.8m depth and bankfull width is between 5- 6.5m.
Structure and Substrate of the River Bed	Extensive silt cover with accumulations of organic material and an unvegetated bare riverbed.
Structure of the Riparian Zone	The channel is extensively shaded with mostly unvegetated banks. The bank face vegetation structure comprises some short creeping grasses, scrubs and shrubs, leaning trees and j-shaped trees. Tall herbs and grasses are also present on the left bank. There are a few deciduous trees and saplings on the right bank. In-channel vegetation comprises some emergent reeds and linear-leaved aquatic vegetation. There are some fallen trees on the right bank top. The left bank top is grazed grassland whilst the right bank is woodland. There is major encroachment of the riparian zone on the left bank.

ELTON LANE DITCH 1

Baseline data for Elton Lane Ditch 1

Watercourse name	Elton Lane Ditch 1
	Water feature type: Ordinary Watercourse Catchment area: <1km^2 Key hydraulic connections: Artificial field drain collecting overland flow and discharging to West Central Drain Surrounding land use: Farming and agricultural, track roads Ditch Condition Score: Fairly Poor
Catchment Characteristics	The channel drains a small catchment of farm and agricultural land, dissected by track roads.
Catchment Geology and Soils	The bedrock geology comprises Kinnerton sandstone formation (sandstone). Elton Lane Ditch 1 is underlain by superficial deposits of clay, silt and sand, formed from tidal flat deposits at the Quaternary shoreline. The catchment features loamy and sandy soils with naturally high groundwater and a peaty surface. These soils drain well into local shallow groundwater. These soils are vulnerable to pollution from nutrients, pesticides and wastes applied to the land.

Watercourse name	Elton Lane Ditch 1
Catchment Hydrology	The channel drains the adjacent farmland and track roads. The watercourse is ungauged.
Historical Channel Change	The planform of the ditch has remained unaltered from its modified form since 1903. Between 1949 – 1970 a perimeter road leading to an industrial estate to the west of Elton Lane Ditch 1 was constructed.
Biological	
Fish	A composite water sample was collected 60m from the proposed Order Limits on 31 May 2022 for e-DNA analysis; however, the total number of target sequences was below the reporting threshold.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.

Watercourse name	Elton Lane Ditch 1
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
<u>Hydromorphological</u>	
Quantity and Dynamics of Flow	The watercourse is a choked channel and water levels are not maintained with a minimum summer depth of less than 50cm. Highly turbid flows, with potential signs of pollution, therefore an overall poor quality of water.
River Continuity	Poor continuity in the summer due to the ephemeral nature of the watercourse. The condition of existing culvert under the field entrance is not known. The channel drains to West Central Drain.
River Depth and Width Variation	The watercourse is a trapezoidal cut ditch with a lack of variation of both width and depth.
Structure and Substrate of the River Bed	Silt and organic accumulations
Structure of the Riparian Zone	Lack of emergent, submerged, and floating leaved plants. Potential signs of eutrophication, potential for non-native plant and animal species. There is a grazed field on the right bank and a hardcore track on the left bank.

ELTON LANE DITCH 4

Baseline data for Elton Lane Ditch 4

Watercourse name	Elton Lane Ditch 4
	Water feature type: Ordinary Watercourse Catchment area: <1km^2 Key hydraulic connections: artificial field drain collecting overland flow and discharging to West Central Drain Surrounding land use: Farming and agricultural, track roads Ditch Condition Score: Fairly Poor
Catchment Characteristics	The channel drains a small catchment of farm and agricultural land dissected by track roads.
Catchment Geology and Soils	The bedrock geology comprises Kinnerton sandstone formation (sandstone). Elton Lane Ditch 4 is underlain by superficial deposits of clay, silt and sand, formed from tidal flat deposits at the Quaternary shoreline. The catchment features loamy and sandy soils with naturally high groundwater and a peaty surface. These soils drain well into local

Watercourse name	Elton Lane Ditch 4
	shallow groundwater. These soils are vulnerable to pollution from nutrients, pesticides and wastes applied to the land.
Catchment Hydrology	The channel drains the adjacent farmland and track roads. The watercourse is ungauged.
Historical Channel Change	The planform of the ditch has maintained the same form since 1903. Between 1949 – 1970 a perimeter road leading to an industrial estate to the west of Elton Lane Ditch 4 was constructed.
Biological	
Fish	Scoped out due to lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse.

Watercourse name	Elton Lane Ditch 4
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	Water levels are not maintained with a minimum summer depth of less than 50cm. It has highly turbid flows with potential signs of pollution therefore overall poor quality of water.
River Continuity	Poor continuity in summer due to ephemeral nature.
River Depth and Width Variation	The channel is a shallow trapezoidal cut ditch. There is evidence of bank poaching from livestock.
Structure and Substrate of the River Bed	Silt and organic accumulation
Structure of the Riparian Zone	Lack of emergent, submerged, and floating leaved plants. Potential signs of eutrophication, potential for non-native plant and animal species. Lack of marginal vegetation. Predominantly land use in the riparian zone is grazed farmland.

ELTON LANE SOUTH DITCH

Baseline data for Elton Lane South Ditch

Watercourse name	Elton Lane South Ditch
No photograph available as access was not possible.	Water feature type: Ordinary Watercourse
	Catchment area: <1km^2
	Key hydraulic connections: land drainage ditch connected to both the West Central Drain and East Central Drain
	Surrounding land use: Farming and agricultural, train track
	Ditch Condition Score: Not surveyed due to land access restrictions
Catchment Characteristics	The channel drains a small catchment of farm and agricultural land, running adjacent to the spur of the Great Northern and London, and North Western Joint Railway.
Catchment Geology and Soils	The bedrock geology comprises Kinnerton sandstone formation (sandstone). Elton Lane South Ditch is underlain by superficial deposits of clay, silt and sand, formed from tidal flat deposits at the Quaternary shoreline. The catchment features loamy and sandy soils with naturally high groundwater and a peaty surface. These soils drain well into local shallow groundwater. These soils are vulnerable to pollution from nutrients, pesticides and wastes applied to the land.

Watercourse name	Elton Lane South Ditch
Catchment Hydrology	The channel drains the adjacent farmland and track roads. The watercourse is ungauged.
Historical Channel Change	First documented as a channel in 1949 –1970 following the construction of the trainline spur into the industrial estate. Prior to the construction of the trainline spur, the channel was around 50m further south, flowing adjacent to the Great Northern and London, and North Western Joint Railway. Prior to 1949, the confluence of the Elton Lane Ditch South and the West Central Drain was located 130m north of its contemporary position. Similarly, the confluence of the Elton Lane Ditch South and East Central Drain were positioned 89 m north-east of the contemporary confluence.
Biological	
Fish	The watercourse could not be accessed for surveys, and therefore aquatic ecology data could not be obtained.
Invertebrates	The watercourse could not be accessed for surveys, and therefore aquatic ecology data could not be obtained.
Macrophytes & Phytoplankton	The watercourse could not be accessed for surveys, and therefore aquatic ecology data could not be obtained.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.

Watercourse name	Elton Lane South Ditch
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	No data is available for this watercourse.
River Continuity	The Elton Lane Ditch South flows between the West Central Drain and East Central Drain.
River Depth and Width Variation	No data is available for this watercourse.
Structure and Substrate of the River Bed	No data is available for this watercourse.
Structure of the Riparian Zone	No data is available for this watercourse.

ELTON MARSH 1 AND 2

Baseline data for Elton Marsh 1 and 2

Watercourse name	Elton Marsh 1 and 2
	Water feature type: Ordinary Watercourse Catchment area: <1km^2 Key hydraulic connections: flows into the West Central Drain Surrounding land use: Farming and agricultural, trainline Ditch Condition Score: Poor
Catchment Characteristics	The channels drain a small catchment of farm and agricultural land to the south of the Great Northern and London and North Western Joint Railway.
Catchment Geology and Soils	The bedrock geology comprises Kinnerton sandstone formation (sandstone). Elton Marsh 1 and 2 are underlain by superficial deposits of clay, silt and sand, formed from tidal flat deposits at the Quaternary shoreline.

Watercourse name	Elton Marsh 1 and 2
	The catchment features loamy and sandy soils with naturally high groundwater and a peaty surface. These soils drain well into local shallow groundwater. These soils are vulnerable to pollution from nutrients, pesticides and wastes applied to the land.
Catchment Hydrology	The channels drain the adjacent farmland. The watercourses are ungauged.
Historical Channel Change	The ditches have remained the same form since 1913, as drainage channels for the surrounding fields.
Biological	
Fish	Scoped out due to lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to lack of macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse.

Watercourse name	Elton Marsh 1 and 2
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	Water levels are not maintained with a minimum summer depth of less than 50cm.
River Continuity	Elton Marsh 1 and Elton Marsh 2 flow into the West Central Drain.
River Depth and Width Variation	The channels are shallow trapezoidal cut ditches, approximately 1m wide.
Structure and Substrate of the River Bed	Silt substrate however the ditches are heavily covered in short grasses.
Structure of the Riparian Zone	A lack of emergent, submerged and floating leaved plants. An absence of marginal vegetation along most of the ditches. The riparian zone is grazed pasture which floods frequently.

WEST CENTRAL DRAIN

Baseline data for West Central Drain

Watercourse name	West Central Drain
	Water feature type: Main River Catchment area: 0.55km^2 Key hydraulic connections: Drains the Elton Marsh Drains (1-13), joined by Hapsford Brook and East Central Drain at Ince Marshes. Flows northwards towards the Manchester Ship Canal where water is pumped into the canal at high flows. The watercourse discharges to Hoolpool Gutter. Surrounding land use: Mostly pastural fields, industrial estates and car parks, track and paved roads, permanently vegetated agriculture, some plantation woodland. River Condition Score: Fairly Poor
Catchment Characteristics	The West Central Drain forms the main stem off the Elton Marsh Drains (1 –13). The channel drains a small catchment of farm and agricultural land. The West Central Drain flows under the Great Northern and London, and North Western Joint Railway line.
Catchment Geology and Soils	The bedrock geology comprises Kinnerton sandstone formation (sandstone). The West Central Drain are underlain by superficial deposits of clay, silt and sand, formed from tidal flat deposits at the

Watercourse name	West Central Drain
	Quaternary shoreline. A smaller superficial deposit of Devensian till is also located within the catchment of the West Central Drain. This sediment is of glaciogenic origin. The catchment features Loamy and sandy soils with naturally high groundwater and a peaty surface. These soils drain well into local shallow groundwater. These soils are vulnerable pollution from nutrients, pesticides and wastes applied to the land.
Catchment Hydrology	The channel drains the adjacent farmland. The watercourse is ungauged.
Historical Channel Change	The Western Central Drain has maintained a similar form since 1914. Areas of the catchment have been industrialised through time, with the addition of car parking and industrial storage spaces. Since 1914, road and tracks have been constructed to access the industrial fertiliser plant located around 950m south of the Manchester Ship Canal. Industrial and agricultural buildings have also been constructed within the catchment, since 1970.
<u>Biological</u>	
Fish	A composite water sample was collected within the proposed Order Limits on 31 May 2022 for e-DNA analysis, however, the sample failed to amplify. Therefore, no baseline data could be obtained.
Invertebrates	Invertebrate sampling was undertaken at the proposed Order Limits on 05 May 2022. The site was assessed as having a

Watercourse name	West Central Drain
	moderate conservation value, with the predominant presence of scoring taxa primarily associated with heavily sedimented watercourses and flowing/standing water. There was no strong dominance by pollutant tolerant or intolerant taxa.
Macrophytes	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Phytoplankton	
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	When sampled on 05 May 2022, the dissolved oxygen level was recorded as 14.04mg/L (150.4% saturation). No long-term monitoring data is available for this watercourse.
Salinity	When sampled on 05 May 2022, salinity was recorded as 0.39 ppt. No long-term monitoring data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	

Watercourse name	West Central Drain
Quantity and Dynamics of Flow	No perceptible flow at time of survey
River Continuity	Few culverted sections under roads and rail tracks.
River Depth and Width Variation	Trapezoidal cut channel, obviously reshaped earth banks, width 6 – 5m, depth 0.8m, mixture of steep and shallow banks.
Structure and Substrate of the River Bed	Extensive silt cover, accumulations of organic material, unvegetated bare riverbed with some aquatic vegetation (filamentous algae, submerged linear-leaved, emergent reeds)
Structure of the Riparian Zone	Channel partially shaded from tall grasses, some trees and saplings. There is little vegetation diversity.

HAPSFORD BROOK

Baseline data for Hapsford Brook

Watercourse name	Hapsford Brook
	Water feature type: Main River
	Catchment area: 2.87km^2
	Key hydraulic connections: Connects to Elton Marsh Drains 9 to 13 in peak flow and discharges to West Central Drain.
	Surrounding land use: Farming and agricultural, M56 to the south, paved road network, suburban.
	River Condition Score: Moderate
Catchment Characteristics	The Hapsford Brook drains the Elton Marshes between Hapsford Lane and the M56. The channel drains a catchment consisting of the suburban area of Elton, rural village of Hapsford and a lorry service station. The Hapsford Brook flows under the Great Northern and London and North Western Joint Railway line. The catchment consists mostly of arable and horticultural grasslands, with some areas of development (Hapsford and Elton). The M56 (junction 14) and A5117 roads dissect the channel south of Elton.

Watercourse name	Hapsford Brook
	The source of the Hapsford Brook rises from Dunham-on-the-Hill (40.1 -60mAOD).
Catchment Geology and Soils	The bedrock geology of the Hapsford Brook Catchment consists of sandstone from both the Kinnerton Sandstone Formation and the Chester Formation (pebbly and gravely).The later formation is fluvial in origin. In the upper part of the catchment, the Hapsford Brook is underlain by the Chester formation (conglomerate) bedrock. This deposit also formed in a fluvial environment, with deposits reflecting the channels, floodplains and levees of the prehistoric rivers and estuary. Hapsford Brook’s superficial geologies comprise mostly Devensian tills, formed under glaciogenic conditions in the Quaternary period. The catchments superficial geology also consists of tidal flat deposits (clay, silt and sands), reflecting the prehistoric shorelines of the area. The catchment features Loamy and sandy soils with naturally high groundwater and a peaty surface. These soils drain well into local shallow groundwater. These soils are vulnerable pollution from nutrients, pesticides and wastes applied to the land. The catchment also comprises slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, with impeded drainage.
Catchment Hydrology	The channel drains the adjacent farmland and track roads. Trapezoidal cut channel. The watercourse is ungauged.

Watercourse name	Hapsford Brook
Historical Channel Change	The planform morphology of the channel has remained the same since 1903. Following construction of the M56 roadway (1968 – 1971), the Hapsford Brook was culverted to maintain flow continuity.
<u>Biological</u>	
Fish	The e-DNA from three species of fish were detected in the composite water sample that was collected from within the proposed Order Limits on 01 June 2022. This included the brown/sea trout *Salmo trutta,* which is listed as Species of Principle Importance (SPI) in accordance with the NERC Act 2006.
Invertebrates	Invertebrate sampling was undertaken within the proposed Order Limits on 07 April 2021. The results indicated the site had moderate conservation value, with the predominant presence of scoring taxa primarily associated with heavily sedimented watercourses and slow flowing/standing water. There was no strong dominance by pollutant tolerant or intolerant taxa.
Macrophytes & Phytoplankton	Scoped out due to the lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
<u>Physico-Chemical</u>	

Watercourse name	Hapsford Brook
Thermal Conditions	When sampled on 07 April 2021, the water temperature was 7.1°C. No long-term monitoring data is available for this watercourse.
Oxygenation Conditions	When sampled on 07 April 2021, the dissolved oxygen level was recorded as 10.57mg/L (87.7% saturation). No long-term monitoring data is available for this watercourse.
Salinity	When sampled on 07 April 2021, salinity was recorded as 0.46 ppt. No long-term monitoring data is available for this watercourse.
Acidification Status	When sampled on 07 April 2021, pH was recorded as 8.12. No long-term monitoring data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	No perceptible flow
River Continuity	The Hapsford Brook flows into the West Central Drain to the north of the Great Northern and London, and North Western Joint Railway spur. The channel is culverted as it flows beneath the railway lines and the M56 roadway.
River Depth and Width Variation	Bankfull channel width if 5.5m and depth 0.4m

Watercourse name	Hapsford Brook
Structure and Substrate of the River Bed	Extensive silt cover, some accumulations of organic matter. Some emergent reeds, linear leaved aquatic vegetation
Structure of the Riparian Zone	Unvegetated channel bed, some shading of the channel bed. Unvegetated bare earth banks with some short, creeping herbs and grasses. Tall herbs and grasses present on some sections of the bank. Low diversity of riparian vegetation.

MERSEY

ELTON BROOK TRIBUTARY 1

Baseline data for Elton Brook Tributary 1

Watercourse name	Elton Brook Tributary 1
	Water feature type: Ordinary Watercourse (Ditch) Catchment area: <1km^2 Key hydraulic connections: Flows westwards into Gale Brook Surrounding land use: Urban, A5117 road, travellers' site, arable and horticultural Ditch Condition Score: Poor
Catchment Characteristics	Elton Brook Tributary 1 drains arable and horticultural land to the south of the A5117. The channel drains a catchment that features the Essar Stanlow Refinery and the suburb of Elton.
Catchment Geology and Soils	The bedrock geology of the channel consists of the Chester Formation. This geology comprises sandstone, pebbly (gravelly) sedimentary bedrock. These deposits were formed in fluvial environments. They are detrital, ranging from coarse- to fine-grained and form beds and lenses of deposits reflecting the

Watercourse name	Elton Brook Tributary 1
	channels, floodplains and levees of a river or estuary (if in a coastal setting). Elton Brook Tributary 1 is underlain by superficial geologies comprise mostly Devensian tills, formed under glaciogenic conditions in the Quaternary period. The soils within the Elton Brook Tributary catchment consists of slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, moderately soils with impeded drainage.
Catchment Hydrology	The catchment drains the surrounding arable and horticultural land. The channel is a cut trapezoidal, cut ditch. The channel flows through a travellers' site, before draining into the Gale Brook.
Historical Channel Change	The surrounding area was previously arable and horticultural land (1888 –1913). During this period the land drained into Gale Brook through a network of cut drains. The ditch, in its contemporary orientation, was constructed following the construction of the A5117 roadway (1945 –1969). The Elton Brook Tributary 1 was formed between 1965 –1970. The channel has maintained its contemporary position since its construction. However, a travellers' site was constructed in the location of the drain between 2009 – 2010 creating bunding on the south bank.
<u>Biological</u>	

Watercourse name	Elton Brook Tributary 1
Fish	Scoped out due to lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	The ditch is of low water quality, displaying potential signs of pollution. There may be some signs of eutrophication.

Watercourse name	Elton Brook Tributary 1
River Continuity	The Elton Brook Tributary 1 flows into the Gale Brook. The channel flows beneath a bridge that is used for access to the caravan site. The ditch is disconnected from its floodplain by incision and artificial bunding.
River Depth and Width Variation	Potential evidence of physical damage along the ditch. It is unlikely that water levels are maintained throughout the summer (likely less than 50cm in depth).
Structure and Substrate of the River Bed	Silt and organic accumulation.
Structure of the Riparian Zone	There is a lack of marginal vegetation. There is a lack of diversity of aquatic vegetation. The channel is likely heavily shaded. Non-native plant species and animals are likely to be present.

GALE BROOK

Baseline data for Gale Brook

Watercourse name	Gale Brook
	Water feature type: Main River Catchment area: 6.64km^2 Key hydraulic connections: The Gale Brook drains into the River Gowy. Surrounding land use: Urban and suburban at the confluence of with the Gowy. Pockets of broadleaved, mixed and yew woodlands. In the headwaters, the land use is mostly arable and horticultural. River Condition Score: Moderate
Catchment Characteristics	The Gale Brook drains agricultural and pastural land in the headwaters. The channel flows through a network of culverts, under the M56, B5132, and the A5117. The channel is culverted as it flows under the Essar Stanlow Refinery. The Brook surfaces from the culvert north of the Great Northern and London, and North-Western Joint Railway line. The Gale Brook rises south-west around 1.18 km of Dunham-on-the-Hill (10mAOD).

Watercourse name	Gale Brook
Catchment Geology and Soils	The bedrock geology of the Gale Brook Catchment consists of sandstone from both the Kinnerton Sandstone Formation and the Chester Formation (pebbly and gravely). The later formation is fluvial in origin. In the upper part of the catchment, the Gale Brook is underlain by the Chester formation (conglomerate) bedrock. This deposit also formed in a fluvial environment, with deposits reflecting the channels, floodplains and levees of the prehistoric rivers and estuary. The Gale Brook is underlain by superficial geologies comprise mostly Devensian tills, formed under glaciogenic conditions in the Quaternary period. The Gale Brook is also underlain by tidal flat deposits - Clay, Silt and Sand. These deposits were formed from shallow-marine deposits. The soils within the Gale Brook catchment consists of slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, moderately soils with impeded drainage. The channel also flows over loamy and sandy soils with naturally high groundwater and a peaty surface.
Catchment Hydrology	The catchment drains the surrounding arable and horticultural land. The channel is disconnected from its floodplain as it flows through a network of culverts and due to being incised. The channel appears to have been artificially straightened. Trapezoidal cut channel in its headwaters. The watercourse is ungauged.

Watercourse name	Gale Brook
Historical Channel Change	The channel has maintained a similar planform since 1914, draining the surrounding farmland. The Gale Brook and Thornton Brook previously shared a confluence, under what is currently the Essar Stanlow Refinery. The Thornton Brook was then realigned to share a confluence with the River Gowy. The channel planform was reconfigured following expansion of the refinery (constructed in 1920 but expanded in area until 1970). The Gale Brook was realigned and reconfigured to flow beneath the refinery. Since 1945 the channel has maintained its planform.
Biological	
Fish	A composite water sample was collected from within the proposed Order Limits on 31 May 2022 for e-DNA analysis, however, the sample failed to amplify. Therefore, no baseline data could be obtained.
Invertebrates	Invertebrate sampling was undertaken at the proposed Order Limits on 20 September 2021. The site had moderate conservation value, with the predominant presence of scoring taxa primarily associated with a heavily sedimented watercourse and flowing/standing water. There was no strong dominance by pollutant tolerant or intolerant taxa.
Macrophytes & Phytoplankton	Scoped out due to the lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.

Watercourse name	Gale Brook
Physico-Chemical	
Thermal Conditions	When sampled on 07 April and 20 September 2021, water temperature was recorded as 7.3°C and 11.9°C, respectively. No long-term monitoring data is available for this watercourse.
Oxygenation Conditions	When sampled on 07 April 2021, dissolved oxygen levels were recorded as 4.46mg/L (37.1% saturation). No long-term monitoring data is available for this watercourse.
Salinity	When sampled on 07 April 2021, salinity was recorded as 0.48 ppt. No long-term monitoring data is available for this watercourse.
Acidification Status	When sampled on 07 April 2021, pH was recorded as 7.77. When sampled on 20th September 2021, pH was recorded as 7.32. No long-term monitoring data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	Non perceptible and smooth flows at time of survey
River Continuity	In the channel headwaters, the channel flows beneath roads, within culvert. The channel has large reaches that are culverted. The longest length of culvert runs under the Essar Stanlow

Watercourse name	Gale Brook
	Refinery (1.37km). The Gale Brook flows through a network of culverts, to the north of the refinery, before meeting its confluence with the Gowy. The watercourse is incised within the Study Area and disconnected from its floodplain.
River Depth and Width Variation	Bankfull width varies between 2.5m and 6m, water depth is approximately 0.2m - 0.3m.
Structure and Substrate of the River Bed	Channel bed material was homogenously silty.
Structure of the Riparian Zone	No non-native invasive plant species observed. Lack of riparian habitat and vegetation complexity. Typically, bare earth with a presence of both short and tall herbs and grasses. Some areas of scrub, shrub and trees. Discrete organic accumulations were also observed

THORNTON UPLANDS

Baseline data for Thornton Uplands

Watercourse name	Thornton Uplands
	Water feature type: Main River Catchment area: $2.32km^2$ Key hydraulic connections: Flows northwards to River Gowy. It is joined by Halls Green Lane Brook and Thornton Marsh Central. Surrounding land use: Farmland, agricultural buildings, M56 road, industrial power generation. River Condition Score: Fairly Poor
Catchment Characteristics	Thornton Uplands drains agricultural and pastural land in the headwaters. The channel flow through a network of culverts, under the M56. The channel is culverted as it flows under Ince Lane and track lanes. The channel rises from farm ditches, around 1.4km southwest of Dunham-on-the-Hill (10 mAOD). The channel flows adjacent to a refinery. Along these reaches, the channel is surrounded by embankments.

Watercourse name	Thornton Uplands
Catchment Geology and Soils	The bedrock geology of the Thornton Upland catchment consists of sandstone; the Chester Formation (pebbly and gravely). These sediments are fluvial in origin. Further downstream, the channel is underlain by the Wilmslow Sandstone Formation consisting of sandstones, formed in environments previously dominated by hot deserts. The superficial deposits within the catchment include Devensian tills, windblown sands, peat, and tidal flat deposits (clay, silt, and sand). In its headlands, the channel is underlain by slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.
Catchment Hydrology	Within the Newbuild Infrastructure Boundary, the channel is trapezoidal, draining surrounding arable, horticultural, and industrial land. The channel appears to have been artificially straightened. The watercourse is gauged at Folly Gates (NGR: SJ 43148 75787).
Historical Channel Change	The channel has maintained a similar planform since 1884 - 1900, draining the surrounding farmland. Downstream of the DCO Proposed Development, where the channel runs adjacent to the Refinery, the channel has been within embankments since 1955 in preparation for the construction of the Refinery.
<u>Biological</u>	

Watercourse name	Thornton Uplands
Fish	Scoped out due to lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	Rippled flows, extensively smooth

Watercourse name	Thornton Uplands
River Continuity	The channel is culverted as it flows under track roads, M56, B5132.
River Depth and Width Variation	Trapezoidal cut channel, obviously reshaped earth banks, width 3-3.5m, depth 0.03m (within Newbuild Infrastructure Boundary).
Structure and Substrate of the River Bed	Mixture of sediment; presence of gravel – pebble sized sediments. Evidence of some sand, with extensive silt and clay components. No organic materials.
Structure of the Riparian Zone	Extensive bare earth banks, some short creeping herbs and grasses, tall herbs and grasses. Scrubs and shrubs were noted. Few trees and saplings, with large wood and fallen trees.

HALLS GREEN LANE BROOK

Baseline data for Halls Green Lane Brook West

Watercourse name	Halls Green Lane Brook West
None available.	Water feature type: Ordinary Watercourse
	Catchment area: <1km^2
	Key hydraulic connections: Halls Green Lane Brook drains into the Thornton Uplands.
	Surrounding land use: Farmland, agricultural buildings, M56 road.

Watercourse name	Halls Green Lane Brook West
	Ditch Condition Score: Poor
Catchment Characteristics	Thornton Uplands drains agricultural and pastural land in the headwaters. The channel flows through a network of culverts, under the M56. The channel is culverted as it flows under Ince Lane and track lanes. The channel rises from farm ditches, around 1.4km southwest of Dunham-on-the-Hill (10mAOD).
Catchment Geology and Soils	The bedrock geology of the Thornton Uplands catchment consists of sandstone; the Chester Formation (pebbly and gravely). These sediments are fluvial in origin. Further downstream, the channel is underlain by the Wilmslow Sandstone Formation consisting of sandstones, formed in environments previously dominated by hot deserts. The superficial deposits within the catchment include Devensian tills, windblown sands, peat, and tidal flat deposits (clay, silt, and sand). In its headlands, the channel is underlain by slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.
Catchment Hydrology	The trapezoidal cut channel drains the surrounding arable and horticultural land. The channel appears to have been artificially straightened along the side of Halls Green Lane. The watercourse is ungauged.
Historical Channel Change	The channel has maintained a similar planform since 1884 - 1900, draining the surrounding farmland. The channel runs adjacent to Halls Green Lane.

Watercourse name	Halls Green Lane Brook West
Biological	
Fish	Scoped out due to lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	The ditch is of low water quality, displaying potential signs of pollution. There may be some signs of eutrophication. Potentially stagnant flows during summer months.

Watercourse name	Halls Green Lane Brook West
River Continuity	Halls Green Lane Brook is disconnected from its floodplain. The brook is not culverted.
River Depth and Width Variation	Potential evidence of physical damage along the ditch. It is unlikely that water levels are maintained throughout the summer (likely less than 50cm in depth).
Structure and Substrate of the River Bed	Silt and organic accumulation.
Structure of the Riparian Zone	There is a lack of marginal vegetation. There is a lack of diversity of aquatic vegetation. The channel is likely heavily shaded. Non-native plant species and animals are likely to be present.

MERSEY

Baseline data for Mersey

Watercourse name	Mersey
None available.	Water feature type: Transitional
	Surface area: 81.791km^2
	Key hydraulic connections: drains Whittle Brook (Mersey Estuary), Mersey (Bollin confluence to Howley Weir) including Padgate Brook, Ditton Brook (Halewood to Mersey Estuary), Manchester Ship Canal, Dibbinsdale Brook and Clatter Brook, Peckmill Brook, Hoolpool Gutter at Ince Marshes, Rivacre Brook, Sankey Brook (Rainford Brook to Mersey), Keckwick Brook, The Birket including Arrowe Brook and Fender, Gowy (Milton Brook to Mersey), Weaver (Dane to Frodsham). The Mersey transitional water feeds into the Mersey Mouth. There are also many non-reportable watercourses which drain into this water body. Within the DCO Proposed Development the Gale Brook, Thornton Uplands, Elton Brook Tributary 1, and Halls Green Lane Brook are within this WFD water body.
	Surrounding land use: Urban and suburban, industrial, agricultural, horticultural, pastural.
	River Condition Score: Not assessed.

Watercourse name	Mersey
Catchment Characteristics	The Mersey estuary is bordered on all sides by majority urban land use, with the city of Liverpool on the right bank and the towns and industrial areas of Runcorn, Ellesmere Port and the Wirral on the left bank, with some smaller areas of rural land use and saltmarsh habitat between Runcorn and Ellesmere Port.
Historical Channel Change	Overarching estuary planform generally unchanged from 1st edition OS maps. Historical dredging from the 19th century has led to changes in the geographic distribution of sand and mud banks. Channel accretion occurs mostly in the inner estuary. Due to this, localised changes to intertidal zones have occurred throughout both banks of the inner estuary.
<u>Biological</u>	
Fish	Scoped out as it is not directly affected by the DCO Proposed Development, and any effects on hydrologically connected watercourses are unlikely to have any significant impact on fish populations within the Mersey.
Invertebrates	Scoped out as it is not directly affected by the DCO Proposed Development, and any effects on hydrologically connected watercourses are unlikely to have any significant impact on invertebrate communities within the Mersey.
Macrophytes & Phytoplankton	Scoped out as it is not directly affected by the DCO Proposed Development, and any effects on hydrologically connected

Watercourse name	Mersey
	watercourses are unlikely to have any significant impact on macrophytes or phytoplankton within the Mersey.
Physico-Chemical	
Transparency	Scoped out as it is not directly affected by the DCO Proposed Development, and any effects on hydrologically connected watercourses are unlikely to have any significant impact on transparency.
Thermal Conditions	Scoped out as it is not directly affected by the DCO Proposed Development, and any effects on hydrologically connected watercourses are unlikely to have any significant impact on thermal conditions.
Oxygenation Conditions	Scoped out as it is not directly affected by the DCO Proposed Development, and any effects on hydrologically connected watercourses are unlikely to have any significant impact on oxygenation conditions.
Nutrient Conditions	Scoped out as it is not directly affected by the DCO Proposed Development, and any effects on hydrologically connected watercourses are unlikely to have any significant impact on nutrient conditions.
Priority Hazardous Substances	Scoped out as it is not directly affected by the DCO Proposed Development, and any effects on hydrologically connected

Watercourse name	Mersey
	watercourses are unlikely to have any significant impact on priority hazardous substances.
Hydromorphological	
Depth Variation	Estuary has a large tidal range, from between 4m at neap tide to 10m at spring tides.
Quality, Structure and Substrate of the Bed	The Mersey estuary is composed largely of sand and silt; significant sand banks exist in the upper estuary (Eastham Sands, Stanlow Banks, Ince Banks and Dungeon Banks), with extensive mud deposits throughout the estuary also. Coarser sediments localised in the vicinity of freshwater tributaries.
Structure of the Intertidal Zone	Mainly composed of sands, with extensive accumulations of mud in the high intertidal area. Extensive saltmarsh habitat exists on the left bank around Ince Banks, between Frodsham and Ellesmere Port.
Freshwater Zone	Freshwater flows are small in relation to the tidal prism (approximately 1%), leading to well-mixed waters. Freshwater flows, such as they are, derive primarily from the River Mersey, Manchester Ship Canal and the Sankey Brook, with minor tributaries offering smaller contributions.
Wave Exposure	Open sea wave exposure is limited within the estuary itself, with internally generated waves fetch-limited.

GOWY (MILTON BROOK TO MERSEY)

THORNTON MAIN DRAIN

Baseline data for Thornton Main Drain

Watercourse name	Thornton Main Drain
	Water feature type: Main River Catchment area: 3.00km^2 Key hydraulic connections: Thornton Ditch 5 – 12 drain into the Thornton Main Drain. Thornton Main Drain continues northwards and joins the River Gowy at the A5117. Surrounding land use: Farmland, agricultural buildings and settlement, landfill site, and peat bog. River Condition Score: Fairly Poor
Catchment Characteristics	Thornton Main Drain drains agricultural and pastural land in its headwaters. The channel flows through a network of culverts, under the M56. The channel rises from farm ditches, around 0.7km northwest of Wimbolds (6mAOD). Potentially some peat bog, surficial water storage within the farmland adjacent to the channel. The entirety of the Gowy Landfill Site falls within the catchment of

Watercourse name	Thornton Main Drain
	the Thornton Main Drain and its feeding ditches (initial land use began in 1995).
Catchment Geology and Soils	The bedrock geology of the Thornton Main Drain catchment consists of sandstone; the Chester Formation (pebbly and gravely). These sediments are fluvial in origin. Further downstream, the channel is underlain by the Wilmslow Sandstone Formation consisting of sandstones, formed in environments previously dominated by hot deserts. The superficial deposits within the catchment include Devensian tills, windblown sands, peat, and tidal flat deposits (clay, silt, and sand). In the upstream reaches of the catchment, the soils are mostly Fen peat.
Catchment Hydrology	The cut channel drains the surrounding arable and horticultural land. The channel appears to have been artificially straightened. The watercourse is ungauged.
Historical Channel Change	The channel has maintained a similar planform since 1884 - 1900, draining the surrounding farmland. There has been expansion of the Gowy Landfill site since 1995.
<u>Biological</u>	
Fish	The e-DNA from six species of coarse fish were detected in the sample that was collected in the vicinity of the proposed Order

Watercourse name	Thornton Main Drain
	Limits on 17 February 2022. This included one protected species, European eel *Anguilla anguilla*, which is listed as Species of Principle Importance (SPI) in accordance with the NERC Act 2006.
Invertebrates	Scoped out due to the lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to the lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	No perceptible flow. Visibly polluted waters.

Watercourse name	Thornton Main Drain
River Continuity	The channel is culverted beneath the M56. It is connected to the natural floodplain of the River Gowy, however separated from the Gowy via flood embankments along the River Gowy.
River Depth and Width Variation	Bankfull width varied between 4.5 – 6m and depth 0.8 - 1m. It is an artificial channel with a lack of geomorphic diversity.
Structure and Substrate of the River Bed	Silts, extensive cover of unvegetated bare sediment, some emergent reeds and floating aquatic vegetation.
Structure of the Riparian Zone	Short herbs and grasses, extensive cover of tall herbs and grasses. Concrete bank protection overlain by bare earth across some banks. Emergent reeds, linear-leaved plants.

RIVER GOWY

Baseline data for River Gowy

Watercourse name	**River Gowy**
	Water feature type: Main River
	Catchment area: 150km^2
	Key hydraulic connections: The River Gowy is the largest river in the region. Upstream of the DCO Proposed Development, it is fed by the Barrow Brook, Back Brook, Milton Brook, Salters Brook and Ashton Brook. The Gowy joined downstream of the DCO Proposed Development by Thornton Main Drain, Thornton Uplands, Stanney Mill Brook and Gale Brook, before it flows into the River Mersey.
	Surrounding land use: Farmland, agricultural buildings, landfill site, settlement, peat bog.
	River Condition Score: Moderate
Catchment Characteristics	Heavily modified channel, variety of geomorphic pressures (e.g., poor soil, nutrient, and livestock management, contaminated land, ecological discontinuity, ground water abstraction, pollution from wastewater industry and local government). The catchment has a maximum elevation of 43m ASL (Helsby Hill). The channel is contained within embankments along most of the channel course. Heavily confined north of the A5117, as the channel passes adjacent to the gasworks.

Watercourse name	River Gowy
Catchment Geology and Soils	The bedrock geology of the River Gowy catchment consists of sandstone; the Chester Formation (pebbly and gravely). These sediments are fluvial in origin. Further downstream, the channel is underlain by the Wilmslow Sandstone Formation consisting of sandstones, formed in environments previously dominated by hot deserts. The watercourse flows partially over the Kinnerton Sandstone Formation, comprising deposits of sedimentary bedrock originating in fluvial, lacustrine, and marine environments within hot, arid climates. The superficial deposits within the catchment include Devensian tills, windblown sands, peat, and tidal flat deposits (clay, silt, and sand). In the upland reaches, the soils are comprised of Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soil. With increasing distance downstream, The main channel and its surrounding areas contain soils that are loamy and clayey floodplain deposits with naturally high groundwater. Within the study area, the soils area comprised of Fen peats.
Catchment Hydrology	The Gowy drains the surrounding arable and horticultural land. The embankments along both banks result in the channel being disconnected from its floodplain. The river is gauged at Bridge

Watercourse name	River Gowy
	Trafford. It is a single thread, naturally meandering channel, with low channel gradient and a lack of geomorphic diversity.
Historical Channel Change	Whilst the confluence of the Gowy and the Mersey has remained in the same position since at least 1892, the remaining course of the Gowy has been heavily modified, with evidence of straightening and realignment across much of the watercourse. In the middle course, the channel has been canalised, homogenising the channel planform. The channel was straightened north of the Ellesmere Port to Warrington Trainline following development of the Ellesmere Port Oil Refinery (post 1945).
Biological	
Fish	An EA catch depletion survey conducted in 2014 2km upstream from the proposed Order Limits recorded eight species of fish in the River Gowy, including two SPIs: European eel and brown/sea trout *Salmo trutta.* The e-DNA from five species of coarse fish were detected in the sample collected in the vicinity of the proposed Order Limits on 17 February 2022, none of which were INNS or protected/notable species.
Invertebrates	Existing EA data collected in 2019 from invertebrate surveys conducted 1.8km downstream of the proposed Order Limits classified this site in the River Gowy to be of low to moderate conservation value and sedimented, with the predominant presence of scoring taxa primarily associated with slow to moderate flows. No

Watercourse name	River Gowy
	protected species were identified, but the INNS amphipod *Crangonyx pseudogracilis*, New Zealand mudsnail *Potamopyrgus antipodarum*, Demon shrimp *Dikerogammarus haemobaphes*, and the snail *Physella* sp., were recorded. Invertebrate sampling undertaken in the vicinity of the proposed Order Limits on 08 September 2021 and 02 March 2022 produced similar results to the EA data with regards to sedimentation (sedimented) and conservation value (moderate). However, the taxa identified were indicative of slow flowing/standing water rather than slow to moderate flows. No protected species were identified in either sample.
Macrophytes & Phytoplankton	An EA macrophyte survey conducted in 2016 1.8km downstream from the proposed Order Limits found 14 species of flowering macrophytes. None of these species were protected, however the INNS Indian balsam *Impatiens glandulifera* was detected. A macrophyte survey was conducted in the vicinity of the proposed Order Limits on 04 May 2022; total macrophyte cover was 35%, comprised of four taxa, with bur reed *Sparganium erectum* and Yellow water-lily *Nuphar lutea* being the most dominant species. No protected or notable species were identified.
<u>Physico-Chemical</u>	
Thermal Conditions	Water quality samples regularly collected by the EA from the River Gowy (near Denison Bridge, approximately 1.1km downstream from the proposed Order Limits) between 2010 – 2013 demonstrate that

Watercourse name	River Gowy
	water temperature ranged from 1.5 - 21.1°C, with a mean of 10.5°C. When sampled within the proposed Order Limits on 08 September 2021 and 02 March 2022, the water temperature was recorded as 15.4 and 7.0°C, respectively.
Oxygenation Conditions	Water quality samples regularly collected by the EA from the River Gowy (near Denison Bridge, approximately 1.1km downstream from the proposed Order Limits) between 2010 – 2013 demonstrate that dissolved oxygen levels ranged from 6.3 - 12.2mg/L (64 – 102% saturation), with a mean of 9.8mg/L (86.9% saturation). When sampled within the proposed Order Limits on 08 September 2021 and 02 March 2022, the dissolved oxygen level was recorded as 16.8mg/L (68.1% saturation) and 10.52mg/L (86.7% saturation), respectively.
Salinity	When sampled on 08 September 2021 and 02 March 2022, salinity was recorded as 0.37 ppt and 0.29 ppt, respectively. No long-term monitoring data was available for this watercourse.
Acidification Status	Water quality samples regularly collected by the EA from the River Gowy (near Denison Bridge, approximately 1.1km downstream from the proposed Order Limits) between 2010 – 2013 demonstrate that pH ranged from 7.4 - 8.2, with a mean of 7.84. When sampled within the proposed Order Limits on 02 March 2022, the pH was recorded as 7.66.
Nutrient Conditions	Water quality samples regularly collected by the EA from the River Gowy (near Denison Bridge, approximately 1.1km downstream from

Watercourse name	River Gowy
	the proposed Order Limits) between 2010 – 2013 demonstrate that nitrate levels ranged from 3.3 - 12.6mg/L, with a mean of 7.5mg/L. No data regarding phosphate is available for this watercourse.
Priority Hazardous Substances	Only one priority hazardous substance, chloride, was monitored in the water quality samples collected from the River Gowy (near Denison Bridge, approximately 1.1km downstream from the proposed Order Limits) between 2010 – 2013. Levels ranged from 35.3 - 83.1mg/L, with a mean of 58.9mg/L.
Hydromorphological	
Quantity and Dynamics of Flow	Mostly smooth flows, some rippled.
River Continuity	The Gowy flows into the Mersey. The channel is culverted as it flows under the M56 and A5117. Numerous pipeline crossings over the Gowy downstream of Newbuild Infrastructure Boundary. The river is disconnected from its floodplain through most of its middle and lower course.
River Depth and Width Variation	Bankfull width is 6.5 - 8m and depth 0.8 - 1m. Generally shallow channel banks, obviously reshaped with set-back embankments. Some berms and eroding cliffs noted within the Newbuild Infrastructure Boundary. Nest holes observed in channel banks.

Watercourse name	River Gowy
Structure and Substrate of the River Bed	Silts, extensive cover of unvegetated bare sediment, some emergent and submerged aquatic vegetation (broad and linear leaved).
Structure of the Riparian Zone	Earth bank material, with extensive cover of grasses, creeping herbs and taller vegetation.

STANNEY MAIN DRAIN

Baseline data for Stanney Main Drain

Watercourse name	Stanney Main Drain
	Water feature type: Main River
	Catchment area: <1km^2
	Key hydraulic connections: This is an artificial drain within the River Gowy floodplain. It is connected to Thornton Ditch (1,2), Mill Brook, Mill Brook Tributary (1,2) and Gowy Tributary (1,2). It joins the River Gowy at the A5117.
	Surrounding land use: Farmland, agricultural buildings, roadways, peat bog.
	River Condition Score: Fairly Poor
Catchment Characteristics	Stanney Main Drain drains agricultural and pastural land in its headwaters. The channel flows through a culvert under the M56. The channel rises from farm ditches, around 0.47km west of Bridge Trafford. Potentially some peat bog, surficial water storage within the farmland adjacent to the channel. It has a maximum catchment altitude of (6mAOD).
Catchment Geology and Soils	The bedrock geology of the Thornton Main Drain catchment consists of sandstone; the Chester Formation (pebbly and gravely). These sediments are fluvial in origin. Further downstream, the channel is underlain by the Wilmslow Sandstone Formation consisting of

Watercourse name	Stanney Main Drain
	sandstones, formed in environments previously dominated by hot deserts. The superficial deposits within the catchment include Devensian tills, windblown sands, peat, and tidal flat deposits (clay, silt, and sand). Within the upstream reaches, the soils consist of slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils. Within the study area, the soils area comprised of Fen peats.
Catchment Hydrology	The cut channel drains the surrounding arable and horticultural land. The channel appears to have been artificially straightened. The watercourse is ungauged.
Historical Channel Change	The channel has retained its planform, as a network of cut ditches, since 1885. Some sections of the channel have been realigned following the construction of the A5117. The channel previously shared a confluence with the Gowy further downstream (approx., 420m downstream from the contemporary position). Following construction of the Ellesmere Port Oil Refinery (post 1949 –1965), the confluence was moved further upstream to the south of the A5117.
<u>Biological</u>	
Fish	A composite water sample was collected from within the proposed Order Limits on 01 June 2022 for e-DNA analysis; however, the total number of target sequences was below the reporting threshold. Therefore, no baseline data could be obtained.

Watercourse name	Stanney Main Drain
Invertebrates	Invertebrate sampling was undertaken in the vicinity of the proposed Order Limits on 05 May 2022. The results indicated the site as low conservation value, with the predominant presence of scoring taxa primarily associated with a heavily sedimented watercourse and flowing/standing water. There was no strong dominance by pollutant tolerant or intolerant taxa.
Macrophytes & Phytoplankton	A macrophyte survey was conducted on 05 May 2022; total macrophyte cover was 60%, comprised of five taxa, with bur reed and reed canary grass *Phalaris arundinacea* being the most dominant species. No protected or notable species were identified.
<u>Physico-Chemical</u>	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	When sampled on the 05 May 2022, the dissolved oxygen level was recorded as 3.67mg/L (38.4% saturation). No long-term monitoring data is available for this watercourse.
Salinity	When sampled on the 05 May 2022, salinity was recorded as 0.41 ppt. No long-term monitoring data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.

Watercourse name	Stanney Main Drain
Hydromorphological	
Quantity and Dynamics of Flow	No perceptible flow
River Continuity	The Stanney Main Drain flows into the Gowy. The channel is culverted as it flows under the M56. In the headwaters of the channel, the catchment is boggy with a less defined channel main stem. The watercourse is connected with the floodplain.
River Depth and Width Variation	Bankfull width is approximately 5.5m and depth 0.5m. It is an over deepened trapezoidal ditch. Benches are present on the banks of the channel.
Structure and Substrate of the River Bed	Silt, extensive cover of bare sediment. Emergent reeds/linear-leaved/horsetails, submerged linear-leaved
Structure of the Riparian Zone	Bare earth banks, a presence of short and tall herbs and grasses, few shrubs and scrubs, some emergent reeds/linear-leaved/horsetails.

STANNEY MILL BROOK

Baseline data for Stanney Mill Brook

Watercourse name	Stanney Mill Brook
	Water feature type: Main River
	Catchment area: 6.95km^2
	Key hydraulic connections: Gowy Tributary 2 connects Stanney Mill Brook and Stanney Main Drain. Picton Brook flows into the Stanney Mill Brook. The Stanney Mill Brook drains into the Gowy downstream of the A5117.
	Surrounding land use: Farmland, agricultural buildings, roadways, Suburban (Picton, Mickle Trafford), Peat bogs.
	River Condition Score: Moderate – Fairly Poor
Catchment Characteristics	Stanney Mill Brook drains agricultural and pastural land. The channel flows through a culvert under the M56. The channel rises north of Mickle Trafford. It has a maximum catchment altitude of (45mAOD). There is a wastewater treatments works on the Stanney Mill Brook south of the A5117.
Catchment Geology and Soils	The bedrock geology of the Stanney Mill Brook catchment consists of sandstone; the Chester Formation (pebbly and gravely). These

Watercourse name	Stanney Mill Brook
	sediments are fluvial in origin. Further downstream, the channel is underlain by the Wilmslow Sandstone Formation consisting of sandstones, formed in environments previously dominated by hot deserts. The superficial deposits within the catchment include Devensian tills, glaciofluvial deposits (sand and gravel), and tidal flat deposits (clay, silt, and sand), Peat. Within the upstream reaches, the soils consist of slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils. Within the study area, the soils area comprised of Fen peats.
Catchment Hydrology	The cut channel drains the surrounding arable and horticultural, and suburban land. The channel appears to have been artificially straightened. The watercourse is ungauged. Potential outfall from Wastewater Treatment Works. Single thread channel. This watercourse is ungauged.
Historical Channel Change	Stanney Mill Brook has retained the same form since 1913. Water treatment works have been present at the same location as is presently, since circa 1950.
<u>Biological</u>	
Fish	Scoped out due to lack of suitable fish habitat identified during the aquatic habitat walkover survey.

Watercourse name	Stanney Mill Brook
Invertebrates	Existing EA data collected in 2014 from invertebrate surveys conducted 1.4km downstream from the proposed Order Limits indicated that the aquatic invertebrate community within Stanney Mill Brook was of low conservation value, with taxa primarily associated with a heavy sedimented watercourse and slow flowing/standing water. Further invertebrate surveys were scoped out due to lack of suitable invertebrate habitat identified within the proposed Order Limits during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton identified during the aquatic habitat walkover survey.
Phytoplankton	
<u>Physico-Chemical</u>	
Thermal Conditions	Water quality samples regularly collected by the EA from the Stanney Mill Brook (near Denison Bridge, approximately 1.3km downstream from the proposed Order Limits) between 2010 – 2013 demonstrate that water temperature ranged from 2.1 - 17.4°C, with a mean of 9.8°C.
Oxygenation Conditions	Water quality samples regularly collected by the EA from the Stanney Mill Brook (near Denison Bridge, approximately 1.3km downstream from the proposed Order Limits) between 2010 – 2013 demonstrate that the dissolved oxygen levels ranged from 1.8 -

Watercourse name	Stanney Mill Brook
	13.7mg/L (18 - 119% saturation), with a mean of 6.13mg/L (47.8% saturation).
Salinity	No data is available for this watercourse.
Acidification Status	Water quality samples regularly collected by the EA from the Stanney Mill Brook (near Denison Bridge, approximately 1.3km downstream from the proposed Order Limits) between 2010 – 2013 demonstrate that the pH ranged from 7.2 - 8.1, with a mean of 7.5.
Nutrient Conditions	Water quality samples regularly collected by the EA from the Stanney Mill Brook (near Denison Bridge, approximately 1.3km downstream from the proposed Order Limits) between 2010 – 2013 demonstrate that the nitrate levels ranged from 2.09 - 12.6mg/L, with a mean of 5.2mg/L.
Priority Hazardous Substances	Only one priority hazardous substance, chloride, was monitored in the water quality samples collected from the Stanney Mill Brook (near Denison Bridge, approximately 1.3km downstream from the proposed Order Limits) between 2010 – 2013. Levels ranged from 36.4 - 323.0mg/L, with a mean of 120.8mg/L.
Hydromorphological	
Quantity and Dynamics of Flow	No perceptible flows.
River Continuity	The Stanney Mill Brook drains into the Gowy. The channel is culverted as it flows under the M56 and the A5117. In the

Watercourse name	Stanney Mill Brook
	headwaters of the channel, the catchment is boggy. Within the Newbuild Infrastructure Boundary the watercourse is disconnected from its floodplain.
River Depth and Width Variation	Bankfull width is 4 - 7m and channel depth is 0.05 – 0.5m.
Structure and Substrate of the River Bed	Mostly silt, with some bare unvegetated bed and berms present. The channel is choked with vegetation.
Structure of the Riparian Zone	Extensive cover of emergent reeds/linear-leaved/horsetails, bare earth banks, some short and tall herbs and grasses.

GOWY TRIBUTARY 2

Baseline data for Gowy Tributary 2

Watercourse name	Gowy Tributary 2
	Water feature type: Ordinary Watercourse Catchment area: 1.1 km^2 Key hydraulic connections: Gowy Tributary 2 flows into Stanney Mill Brook and the River Gowy. Surrounding land use: Farmland, agricultural buildings, roadways. River Condition Score: Access reach: Moderate Stoak reach: Fairly Poor.
Catchment Characteristics	Gowy Tributary 2 drains agricultural and pastural land. The channel flows through a culverts under the M53, Fox Covert Lane and Picton Lane. The channel rises west of Upton Health. It has a maximum catchment altitude of (42mAOD).
Catchment Geology and Soils	The bedrock geology of the Gowy Tributary 2 catchment consists of sandstone; the Chester Formation (pebbly and gravely). These sediments are fluvial in origin. The superficial deposits within the catchment include Devensian tills.

Watercourse name	Gowy Tributary 2
	The soils within the catchment consist of slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.
Catchment Hydrology	The ordinary watercourse drains the surrounding arable and horticultural, and suburban land. The channel appears to have been artificially straightened. The watercourse is ungauged.
Historical Channel Change	Gowy Tributary 2 has retained the same form since 1913.
Biological	
Fish	A composite water sample was collected within the proposed Order Limits on 01 June 2022 for e-DNA analysis, however, the sample failed to amplify. Therefore, no baseline data could be obtained.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.

Watercourse name	Gowy Tributary 2
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
<u>Hydromorphological</u>	
Quantity and Dynamics of Flow	Ripple and smooth flows. Some unbroken standing waves
River Continuity	Gowy Tributary 2 drains into the Gowy. The channel is culverted as it flows under the M53, Fox Covert Lane and Picton Lane. At the proposed site access crossing the channel is connected to its floodplain. Nearer the Gowy the watercourse is in an incised ditch and disconnected from the floodplain.
River Depth and Width Variation	Bankfull river width is 1.5 - 2.75m and river depth is 0.05 - 0.1m. It has reshaped banks at the three locations where surveys were carried out.
Structure and Substrate of the River Bed	Gravel and pebbles, mostly silts and clays. Extensive coverage of bare sediment. Large wood present in the channel, upstream of Picton Lane.
Structure of the Riparian Zone	Extensive cover of bare earth, short and tall creeping herbs and grasses, some saplings and trees, evidence of bank erosion (j-shaped and learning trees). Some discrete accumulations of sediment. Shrubs and trees leaning into the channel. Some trees

Watercourse name	Gowy Tributary 2
	and shrubs growing in the channel., wood crossing the channel. Reinforced channel bed. Partially shaded channel. Evidence of bank erosion from animals.

WERVIN HALL DITCH TRIBUTARY

Baseline data for Wervin Hall Ditch Tributary

Watercourse name	Wervin Hall Ditch Tributary
	Water feature type: Ordinary Watercourse Catchment area: <1km^2 Key hydraulic connections: Flows into Wervin Hall Ditch which flows under the Shropshire Union Canal and joins Canal Ditch; part of Finchetts Gutter water body. Surrounding land use: Farmland, agricultural buildings, roadways, Shropshire Union Canal, plantation woodland. Ditch Condition Score: Poor
Catchment Characteristics	Wervin Hall Ditch Tributary drains agricultural and pastural land. The channel rises east of Caughall Road. Maximum catchment altitude of (circa 39mAOD).
Catchment Geology and Soils	The bedrock geology of the Wervin Hall Ditch Tributary catchment consists of sandstone; the Chester Formation (pebbly and gravely). These sediments are fluvial in origin.

Watercourse name	Wervin Hall Ditch Tributary
	The superficial deposits within the catchment include Devensian tills, alluvial fan deposits (sand and gravels) and tidal and riverine flat deposits (clay, silt, sand and gravel). Wervin Hall Ditch Tributary consist of soils that are freely draining slightly acid sandy soils. Within the wider catchment, the soils are slowly permeable seasonally wet slightly acid but base-rich loamy and clayey.
Catchment Hydrology	The cut channel drains the surrounding arable and horticultural, and suburban land. The channel appears to have been artificially straightened. The watercourse is ungauged.
Historical Channel Change	The channel planform has remained consistent, as a farm ditch, since 1892.
Biological	
Fish	Suitable fish habitat was identified during the aquatic habitat walkover survey. However, the site was dry when revisited for e-DNA sampling.
Invertebrates	Invertebrate sampling was undertaken within the proposed Order Limits on 05 May 2022. The results indicated moderate conservation value, with the predominant presence of scoring taxa primarily associated with and a heavily sedimented watercourse and flowing/standing water. There was no strong dominance by pollutant tolerant or intolerant taxa.

Watercourse name	Wervin Hall Ditch Tributary
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	When surveyed on 05 May 2022, the dissolved oxygen level recorded was 3.11mg/L (30.3% saturation). No long-term monitoring data is available for this watercourse.
Salinity	When surveyed on 05 May 2022, the salinity recorded was 0.18 ppt. No long-term monitoring data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	Poor water quality, water levels are not maintained with a minimum summer depth of less than 50cm. Highly turbid flows, with potential signs of pollution, overall poor quality of water.
River Continuity	The incised ditch is not connected to its floodplain. It is culverted beneath the Shropshire Union Canal.

Watercourse name	Wervin Hall Ditch Tributary
River Depth and Width Variation	Water levels are not maintained with a minimum summer depth of less than 50cm.
Structure and Substrate of the River Bed	Sand, silt and gravel mix.
Structure of the Riparian Zone	Lack of emergent, submerged, and floating leaved plants. Potential signs of eutrophication, potential for non-native plant and animal species.

SHROPSHIRE UNION CANAL

Baseline data for Shropshire Union Canal

Watercourse name	Shropshire Union Canal
	Water feature type: Canal
	Catchment area: n/a (artificial canal system)
	Key hydraulic connections: The canal joins the Manchester Ship Canal to the River Dee at Chester.
	Surrounding land use: Rural (farmland, arable and pastoral), woodland, urban, industrial, recreational (golf courses, etc)
	River Condition Score: Fairly poor
Catchment Characteristics	Artificial channel built in the late 18th century for industry and trade. Ellesmere and Chester canal branches. 16 locks separate Manchester Ship Canal from River Dee.
Catchment Geology and Soils	n/a (artificial canal)
Catchment Hydrology	Series of weirs and locks controls water level throughout the canal system.

Watercourse name	Shropshire Union Canal
Historical Channel Change	Additional branches of canal added throughout the early 19th century, completed in 1835.
Biological	
Fish	The e-DNA from 12 species of fish were detected in the sample that was collected from within the proposed Order Limits on 16 February 2022, including one SPI, European eel. No INNS were detected.
Invertebrates	Existing EA data collected in 2016 from invertebrate surveys conducted 5.4km downstream from the proposed Order Limits classified this site within the Shropshire Union Canal to be of moderate conservation value, with the predominant presence of scoring taxa primarily associated with a sedimented watercourse and slow/sluggish flow. Further invertebrate surveys were scoped out due to lack of suitable invertebrate habitat identified within the proposed Order Limits during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	A macrophyte survey was conducted on 04 May 2022; total macrophyte cover was 30%, comprised of three taxa, with bulrush *Typha latifolia* being the most dominant species. No protected or notable species were identified.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.

Watercourse name	Shropshire Union Canal
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	No perceptible flow.
Connection to Groundwater	It is assumed the canal is lined to prevent ingress of groundwater
River Continuity	Locks and sluices maintain water level throughout canal.
River Depth and Width Variation	Width uniformly 10m across, depth approximately 1.5m
Structure and Substrate of the River Bed	Canal bed is composed of silts.
Structure of the Riparian Zone	Sheet piled on both banks, with towpath on right bank. Canal level is higher than adjacent ground level.

MANCHESTER SHIP CANAL

Baseline data for Manchester Ship Canal

Watercourse name	Manchester Ship Canal
	Water feature type: Canal Catchment area: n/a (artificial canal) Key hydraulic connections: River Irwell; River Irk; River Medlock Surrounding land use: Major industrial and urban centres in canal catchment. Large areas of farmland. River Condition Score: Not surveyed
Catchment Characteristics	Major artificial canal, extensively used for shipping and trade.
Catchment Geology and Soils	n/a (artificial canal)
Catchment Hydrology	Multiple locks and sluices maintain water levels within the channel.
Historical Channel Change	Channel construction in the late 19th century, no changes to course in intervening years.

Watercourse name	Manchester Ship Canal
Biological	
Fish	Scoped out as the watercourse is not crossed or directly impacted by the DCO Proposed Development.
Invertebrates	Scoped out as the watercourse is not crossed or directly impacted by the DCO Proposed Development.
Macrophytes	Scoped out as the watercourse is not crossed or directly impacted by the DCO Proposed Development.
Phytoplankton	
Physico-Chemical	
Thermal Conditions	Scoped out as the watercourse is not crossed or directly impacted by the DCO Proposed Development.
Oxygenation Conditions	Scoped out as the watercourse is not crossed or directly impacted by the DCO Proposed Development.
Salinity	Scoped out as the watercourse is not crossed or directly impacted by the DCO Proposed Development.
Acidification Status	Scoped out as the watercourse is not crossed or directly impacted by the DCO Proposed Development.

Watercourse name	Manchester Ship Canal
Nutrient Conditions	Scoped out as the watercourse is not crossed or directly impacted by the DCO Proposed Development.
Priority Hazardous Substances	Scoped out as the watercourse is not crossed or directly impacted by the DCO Proposed Development.
Hydromorphological	
Quantity and Dynamics of Flow	Flow is likely to be smooth.
River Continuity	Locks and sluices maintain water level in canal.
River Depth and Width Variation	Canal varies between 14 – 24m in width, and up to 9m depth.
Structure and Substrate of the River Bed	Canal is likely to have a silt and mud substrate.
Structure of the Riparian Zone	Tow path and other urban infrastructure, as well as recreational rural areas (fields, trees in country parks, golf courses etc).

FINCHETTS GUTTER

COLLINGE WOOD BROOK

Baseline data for Collinge Wood Brook

Watercourse name	Collinge Wood Brook
	Water feature type: Ordinary Watercourse
	Catchment area: <1km^2
	Key hydraulic connections: Onward connection to canal ditch and is likely culverted beneath Shropshire Union Canal to join Finchetts Gutter.
	Surrounding land use: Farm buildings and tracks, improved grassland, arable and horticultural land, some broadleaved, mixed and yew woodland
	River Condition Score: Not surveyed
Catchment Characteristics	Drains agricultural and pastural land. It has a maximum catchment altitude of (~ 42mAOD - ~11mAOD).
Catchment Geology and Soils	Bedrock geology comprising the Chester Formation (sandstone, pebbly, gravelly). The superficial geology of the catchment consists

Watercourse name	Collinge Wood Brook
	of Devensian tills (diamicton) and Tidal Flat Deposits - Clay, Silt and Sand.
Catchment Hydrology	The cut channel drains the surrounding arable and horticultural land. The channel appears to have been artificially straightened. The watercourse is ungauged.
Historical Channel Change	The channel has retained the same planform since 1892
Biological	
Fish	Scoped out due to lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.

Watercourse name	Collinge Wood Brook
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	No perceptible flows, uniform dry channel bed at time of survey
River Continuity	Dry channel bed along a hedgerow and farm track. Disconnected from floodplain.
River Depth and Width Variation	Gently sloping banks, straightened channel planform, rectangular and trapezoidal ditch, channel bankfull width ~1.5m, channel is re-sectioned, over deepened, and disconnected from floodplain.
Structure and Substrate of the River Bed	Fine bed material, with no visible channel bed features, unconsolidated bed.
Structure of the Riparian Zone	Continuous riparian buffer along right bank. Track on right bank top, uniform and simple riparian zone structure. Improved extensive grassland cover. Bank materials composed of cohesive earth. Simple bank face vegetation, with semicontinuous tree-lined on the right bank. Channel is heavily shaded

RAKE LANE BROOK

Baseline data for Rake Lane Brook

Watercourse name	Rake Lane Brook
	Water feature type: Ordinary Watercourse Catchment area: 3.3km^2 Key hydraulic connections: This watercourse flows beneath the Shropshire Union Canal and joins Finchetts Gutter. Surrounding land use: Pasture, grassland, and woodland. River Condition Score: Moderate.
Catchment Characteristics	The watercourse is ~ 0.7km long. Elevation varies from 24m to 20mAOD.
Catchment Geology and Soils	Geology is dominated by sandstone and conglomerate. Soils in the catchment are slightly acid loamy and clayey soils with impeded drainage and slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils

Watercourse name	Rake Lane Brook
Catchment Hydrology	No gauge records are available for this catchment.
Historical Channel Change	No change in planform can be seen from existing online maps (from 1982 onwards).
Biological	
Fish	Scoped out due to lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.

Watercourse name	Rake Lane Brook
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	The flow is relatively small, typical of first order catchments.
River Continuity	The river continuity is good, no impoundments or abstraction occurs along the watercourse.
River Depth and Width Variation	This watercourse has a shallow and narrow wetted channel. At time of survey is had a water depth of 0.05m. Channel width varied between 0.5m and 0.8m.
Structure and Substrate of the River Bed	The riverbed substrate is rich in silt and organic particles.
Structure of the Riparian Zone	The riparian zone is primarily permanently vegetated agricultural. The fields on both banks are grazed. There is a hedgerow along the right bank.

BACKFORD BROOK

Baseline data for Backford Brook

Watercourse name	Backford Brook
	Water feature type: Main River Catchment area: 4.97km² Key hydraulic connections: There are three tributaries of Backford Brook which drain land south of Dunkirk and the M56. Backford Brook is culverted beneath the Shropshire Union Canal and then joins Finchetts Gutter. Surrounding land use: Pasture, grassland, and woodland. River Condition Score: Fairly Good upstream of field culvert. Fairly Poor downstream of field culvert.
Catchment Characteristics	Elevation varies from 38m, to 19mAOD. The catchment is predominantly rural.
Catchment Geology and Soils	Geology is dominated by sandstone and conglomerate. Soils in the catchment are slightly acid loamy and clayey soils with impeded drainage and loamy and sandy soils with naturally high groundwater and a peaty surface

Watercourse name	Backford Brook
Catchment Hydrology	No gauge records are available for this catchment.
Historical Channel Change	No change in planform can be seen from existing online maps (from 1982 onwards).
<u>Biological</u>	
Fish	One species was recorded during a single catch electric fishing survey undertaken on 21 September 2021, three-spined stickleback *Gasterosteus aculeatus*. Due to the dense silt bed impacting the efficacy of electric fishing methods, e-DNA sampling was also conducted on 01 June 2022. The e-DNA from two species of fish were detected in the composite water sample, including on SPI, European eel.
Invertebrates	Invertebrate sampling was undertaken within the proposed Order Limits on 08 April and 21 September 2021. Results indicated that the site had low conservation value, with the predominant presence of scoring taxa primarily associated with sedimented (spring sample)/heavily sedimented (autumn sample) and slow flowing/standing water. There was no strong dominance by pollution tolerant or intolerant taxa.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
<u>Physico-Chemical</u>	

Watercourse name	Backford Brook
Thermal Conditions	Water quality samples regularly collected by the EA from the Backford Brook (Institute Road Bridge, approximately 200m upstream from the proposed Order Limits) between July 2011 – January 2013 demonstrated water temperature ranged from 3.9 - 14.8°C, with a mean of 10.1°C. When sampled within the proposed Order Limits on 08 April and 21 September 2021, the water temperature was recorded as 6.5°C and 12.9°C, respectively.
Oxygenation Conditions	Water quality samples regularly collected by the EA from the Backford Brook (Institute Road Bridge, approximately 200m upstream from the proposed Order Limits) between July 2011 – January 2013 demonstrated dissolved oxygen levels ranged from 5.24 - 13.6mg/L (49-116% saturation), with a mean of 9.8mg/L (86.26% saturation).When sampled at the proposed crossing point on 08 April and 21 September 2021, the dissolved oxygen level was recorded as 10.42 mg/L (85.1% saturation) and 9.8 mg/L, respectively.
Salinity	When sampled on 08 April 2021, salinity was recorded as 0.63 ppt. No long-term monitoring data is available for this watercourse.
Acidification Status	Water quality samples regularly collected by the EA from the Backford Brook (Institute Road Bridge, approximately 200m upstream from the proposed Order Limits) between July 2011 – January 2013 demonstrated the pH ranged from 7.21 - 8.32, with a mean of 7.8. When sampled within the proposed Order Limits on 08

Watercourse name	Backford Brook
	April and 21 September 2021, pH was recorded as 7.96 and 7.15, respectively.
Nutrient Conditions	Water quality samples regularly collected by the EA from the Backford Brook (Institute Road Bridge, approximately 200m upstream from the proposed Order Limits) between July 2011 – January 2013 demonstrated nitrate levels ranged from < 0.196 - 16.2mg/L, with a mean of 5.9mg/L
Priority Hazardous Substances	
Hydromorphological	
Quantity and Dynamics of Flow	Flow within the channel is predominantly smooth with some rippled flow and broken standing waves. The reach within the Newbuild Infrastructure Boundary is fairly shallow in gradient, however there is a steep upper reach and a sudden drop in level at the canal culvert therefore flow is not stagnant. Large wood accumulations and log jams create flow type diversity within the channel.
River Continuity	The watercourse is culverted beneath a field access within the Newbuild Infrastructure Boundary. The watercourse is also culverted beneath the Shropshire Union Canal.
River Depth and Width Variation	Upstream of the field culvert, the channel varies in width and depth, but it has approximately 0.5m and bankfull width is approximately 1.1m throughout the studied reach. The Backford Brook has a sinuous channel, with step-pools created by log jams, thus providing

Watercourse name	Backford Brook
	good in-channel habitat diversity. In addition, there are mature trees lining the channel with fallen trees and extensive large wood habitat along the reach upstream of the field boundary culvert. Downstream of the field culvert the watercourse flows through a modified reach featuring armoured banks and a trapezoidal cross section. The riparian zone in this reach has fewer trees and fallen trees and uninterrupted flow.
Structure and Substrate of the River Bed	The substrate is made of sand and silt, with traces of organic matter.
Structure of the Riparian Zone	The riparian zone is mostly pasture, with a single line of mature trees along the bank top of the watercourses. The treeline is more mature in the reach upstream of the field culvert. Many trees have fallen creating very large wood habitat on the bank top, bank face and in-channel. Some fallen trees are willow species and are regenerating.

FRIARS PARK DITCH

Baseline data for Friars Park Ditch

Watercourse name	Friars Park Ditch
	Water feature type: Ordinary Watercourse Catchment area: 0.135km^2 Key hydraulic connections: This watercourses flow southeast, under the Shropshire Union Canal and connects to Finchetts Gutter. Surrounding land use: Pasture, grassland, and woodland. River Condition Score: Fairly Good
Catchment Characteristics	The watercourse drains a catchment south of Lea-by-Backford. The elevation ranges from 12m to 25mAOD.
Catchment Geology and Soils	Geology is dominated by sandstone and conglomerate. Soil in the catchment is slightly acid loamy and clayey soils with impeded drainage.
Catchment Hydrology	No gauge records are available for this catchment.

Watercourse name	Friars Park Ditch
Historical Channel Change	No change in planform can be seen from existing online maps (from 1982 onwards).
Biological	
Fish	Scoped out due to lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.

Watercourse name	Friars Park Ditch
Hydromorphological	
Quantity and Dynamics of Flow	Flow within the channel is predominantly smooth with some rippled flow and broken standing waves.
River Continuity	The watercourse is in a deep channel much lower than the surrounding pasture. The watercourse is culverted beneath the Shropshire Union Canal.
River Depth and Width Variation	River depth varies from 0.03m to 0.15m, and river width from 0.3m to 0.5m.
Structure and Substrate of the River Bed	The watercourse substrate is dominated by silt with organic matter overlaying the silt.
Structure of the Riparian Zone	The riparian zone is primarily composed of permanently vegetated agriculture. There is a line of mature trees along the bank top of the watercourse, with more vegetation on the bank face.

GYPSY LANE BROOK

Baseline data for Gypsy Lane Brook

Watercourse name	Gypsy Lane Brook
	Water feature type: Ordinary Watercourse Catchment area: 1.51km^2 Key hydraulic connections: Network of hedgerow ditches, which flows southeast, beneath the Shropshire Union Canal and then joins Finchetts Gutter. Surrounding land use: Improved grassland, neutral grassland, arable and horticultural land, broad, mixed and yew woodland, urban development (Lea by Backford) River Condition Score: No survey completed
Catchment Characteristics	The catchment includes local farmland and arable fields. It has an elevation range between 14m and 41mAOD.
Catchment Geology and Soils	The bedrock geology of the catchment includes the Chester Formation, comprising sandstones, and pebbly/ gravelly sediments. Superficial deposits consist of diamicton formed under ice age conditions. Soils within the comprising slightly acid loamy and clayey

Watercourse name	Gypsy Lane Brook
	soils with impeded drainage. The catchment also comprises Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.
Catchment Hydrology	No gauge records are available for this catchment. The channel is culverted as it flows beneath Grove Road and Station Road.
Historical Channel Change	The channel appears to have been artificially straightened as it follows the natural boundary of the arable fields. The channel has retained its planform since 1892.
Biological	
Fish	Scoped out due to lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse.

Watercourse name	Gypsy Lane Brook
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	This is an ephemeral watercourse. When there is water in the channel it is likely to have no perceptible flow.
River Continuity	There are no artificial impoundments on the watercourse however it is culverted beneath Grove Road and Station Road, as well as the Shropshire Union Canal. It flows through an overdeepened channel along a hedgerow.
River Depth and Width Variation	The watercourse has a straight channel planform and rectangular and trapezoidal cross section. It has been resectioned, over-deepened and disconnected from floodplain. Channel depth is around 1.5 m, and bankfull width is around 1.5m
Structure and Substrate of the River Bed	At time of survey there was an obscured view of the channel bed, precluding identification of the channel bed material.
Structure of the Riparian Zone	Within the Newbuild Infrastructure Boundary, there is a hedgerow along the right bank of the channel. The predominant land use within

Watercourse name	Gypsy Lane Brook
	the riparian zone is arable and pastoral farming. There is simple bank top and bank face vegetation. There channel is heavily shaded, with semi-continuous treeline on the bank top.

OVERWOOD DITCH

Baseline data for Overwood Ditch

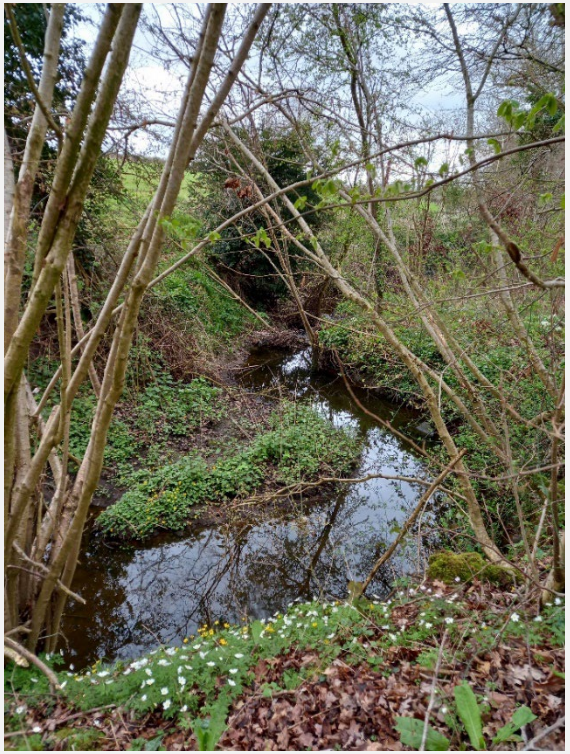
Watercourse name	Overwood Ditch
	Water feature type: Ordinary Watercourse (Hedgerow Ditch) Catchment area: <1km^2 Key hydraulic connections: Overwood Ditch flows southwards towards Finchetts Gutter Tributary. There is a pond which flows into Overwood Ditch. Surrounding land use: The ditch flows through a field used for pastoral farming. The wider area is predominantly rural. River Condition Score: No survey completed
Catchment Characteristics	This is a small catchment which is dominated by agricultural land uses.
Catchment Geology and Soils	The bedrock geology of the catchment includes the Chester Formation, comprising sandstones, and pebbly/ gravelly sediments. Superficial deposits consist of diamicton formed under ice age conditions. The catchment comprises slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.

Watercourse name	Overwood Ditch
Catchment Hydrology	This watercourse drains a small catchment which has predominantly rural and agricultural land use.
Historical Channel Change	The channel appears to have been artificially straightened as it follows the natural boundary of the arable fields. The channel has retained its planform since 1892.
Biological	
Fish	Scoped out due to lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse

Watercourse name	Overwood Ditch
Nutrient Conditions	No data is available for this watercourse
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	This is an ephemeral watercourse. When there is water in the channel it is likely to have no perceptible flow.
River Continuity	The watercourse has not major impoundments downstream of the DCO Proposed Development, other than culverts beneath small roads.
River Depth and Width Variation	The watercourse has a straight channel planform and rectangular and trapezoidal cross section. It has been resectioned, over-deepened and disconnected from floodplain.
Structure and Substrate of the River Bed	At time of survey there was an obscured view of the channel bed, precluding identification of the channel bed material. Based on catchment land use and gradients, bed material is likely to be fine material such as silt.
Structure of the Riparian Zone	Within the Newbuild Infrastructure Boundary, there is a hedgerow along both banks of the channel. The predominant land use within the riparian zone is pastoral farming. There is simple bank top and bank face vegetation. There channel is heavily shaded, with semi-continuous treeline on the bank top.

FINCHETTS GUTTER TRIBUTARY

Baseline data for Finchetts Gutter Tributary

Watercourse name	Finchetts Gutter Tributary
 **Fairly Good section within Newbuild Infrastructure Boundary**	Water feature type: Ordinary Watercourse
	Catchment area: 3.21km^2
	Key hydraulic connections: Finchetts Gutter Tributary flows southeast towards Blacon, under which it is culverted. It joins the Finchetts Gutter south of Saughall Road.
	Surrounding land use: Within the Newbuild Infrastructure Boundary, the land use is predominantly arable and horticultural land, improved grassland, neutral grassland, some broadleaved mixed and yew woodland. There is urban development in Mollington and along Parkgate Road.
	River Condition Score: Fairly good in the upper reach and moderate in the lower reach within the Newbuild Infrastructure Boundary.

Watercourse name	Finchetts Gutter Tributary
 **Moderate section within Newbuild Infrastructure Boundary**	
Catchment Characteristics	The watercourse is approximately 7km in length, with an elevation range between 10m and 46mAOD. The catchment drains local farmland and arable fields. The catchment is rural in nature, with mainly open farmland and has some small areas of trees standing. Relatively shallow gradient and unconfined floodplain. Channel slightly sinuous, although realigned for agriculture in the past.
Catchment Geology and Soils	Bedrock composed of the Kinnerton Sandstone formation. Superficial geology composed of Devensian till and diamicton.

Watercourse name	Finchetts Gutter Tributary
Catchment Hydrology	The catchment rises to the north west near Capenhurst, flowing south east. Runoff from greenfield contributes to flow. There are no observed impoundments to flow present other than culverts beneath small roads.
Historical Channel Change	No significant changes in channel course since the 1st edition OS maps (1888)
Biological	
Fish	An e-DNA sample collected from within the proposed Order Limits on 16 Feb 2022 did not produce any target reads, with only common contaminant sequences detected. Therefore, no baseline data is available for this watercourse.
Invertebrates	Invertebrate sampling was undertaken within the proposed Order Limits on 19 May and 20 September 2021. Results indicated that the site had low conservation value, with the predominant presence of scoring taxa primarily associated with a heavily sedimented watercourse and flowing/standing water. There was no strong dominance by pollutant tolerant or intolerant taxa.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	

Watercourse name	Finchetts Gutter Tributary
Thermal Conditions	When sampled on 19 May and 20 September 2021, the recorded water temperature was 9.6°C and 12.3°C. No long-term monitoring data is available for this watercourse.
Oxygenation Conditions	When sampled on 9 May and 20 September 2021, the dissolved oxygen level was recorded as 9.48 mg/L (83.6% saturation) and 6.4mg/L (saturation level not recorded), respectively. No long-term monitoring data is available for this watercourse.
Salinity	When sampled on 19 May 2021, salinity was recorded as 0.39 ppt. No long-term monitoring data is available for this watercourse.
Acidification Status	When sampled on 9 May and 20 September 2021, pH was recorded as 7.66 and 7.26, respectively. No long-term monitoring data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	Within the surveys area in the Newbuild Infrastructure Boundary, there are variable flow types, ranging from smooth flows to unbroken standing waves, with one small reach of chute flow.
River Continuity	There were no artificial impoundments or structures to impede flow and sediment continuity observed within surveyed reach.

Watercourse name	Finchetts Gutter Tributary
River Depth and Width Variation	Bankfull width is up to 10m in some locations within the study reach. Water depths are shallow, approximately 0.2m on average throughout surveyed reach.
Structure and Substrate of the River Bed	Primarily gravel and pebble, with areas of sand and silt present on channel bed.
Structure of the Riparian Zone	Channel lined with trees and scrub on both banks. Beyond the immediate treeline there is agricultural land on both banks.

SEALAND MAIN DRAIN

Baseline data for Sealand Main Drain

Watercourse name	Sealand Main Drain
	Water feature type: Main River
	Catchment area: 6.74km²
	Key hydraulic connections: The Sealand Main Drain receives water from the Seahill Drain and the Garden City Gutter before flowing to the River Dee.
	Surrounding land use: Tilled farm land, pasture, grassland, woodland and urban. There is a golf course on the right bank of the watercourse, close to the DCO Proposed Development.
	River Condition Score: Fairly poor
Catchment Characteristics	The catchment is marked by several artificial watercourses; therefore, it is unlikely to reflect the original geometry.
Catchment Geology and Soils	Catchment geology is sandstone and conglomerate. The catchment soil is loamy and clayey soils of coastal flats with naturally high groundwater.
Catchment Hydrology	No gauge records are available for this catchment.

Watercourse name	Sealand Main Drain
Historical Channel Change	No change in planform can be seen from existing online maps (from 1982 onwards).
Biological	
Fish	Natural Resource Wales (NRW) advised that one SPI, European eel, is present in this watercourse. The reach within the proposed Order Limits was however scoped out of further survey due to a lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Invertebrate sampling was undertaken within the proposed Order Limits on 09 April and 20 September 2021. Results indicated that the site had low conservation value, with the predominant presence of scoring taxa primarily associated with and heavily sedimented watercourse and flowing/standing water. There was a slight dominance by pollutant tolerant taxa.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	When sampled on 09 April and 20 September 2021, the water temperature was 8°C and 13.1°C, respectively. No long-term monitoring data is available for this watercourse.

Watercourse name	Sealand Main Drain
Oxygenation Conditions	When sampled on 09 April and 20 September 2021, the dissolved oxygen level was recorded as 7.71mg/L (65.3% saturation) and 32.5mg/L (no saturation level recorded), respectively. No long-term monitoring data is available for this watercourse.
Salinity	When sampled on 09 April 2021, salinity was recorded as 0.72 ppt. No long-term monitoring data is available for this watercourse
Acidification Status	When sampled on 09 April and 20 September 2021, pH was recorded as 7.79 and 7.52, respectively. No long-term monitoring data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	Resectioned straight drain with low water level. Flow is generally smooth.
River Continuity	No impoundments have been recorded. Therefore, continuity is good. The channel is incised artificially in order to store and channel flood flows to the River Dee through the floodplain. Therefore, the watercourse is disconnected from its floodplain.
River Depth and Width Variation	Watercourse geometry is minimal throughout the study area. Water width is ~ 1.1m, and water depth is ~ 0.15m.

Watercourse name	Sealand Main Drain
Structure and Substrate of the River Bed	The bed is dominated by silt particles and low morphological diversity.
Structure of the Riparian Zone	The riparian zone is primarily arable agriculture.

SEAHILL TRIBUTARY 2

Baseline data for Seahill Tributary 2

Watercourse name	Seahill Tributary 2
	Water feature type: Ordinary Watercourse Catchment area: 0.270km^2 Key hydraulic connections: There is no upstream watercourse draining into it. This watercourse joins the Seahill Drain at its downstream end. Surrounding land use: Arable agriculture. River Condition Score: Fairly poor
Catchment Characteristics	Highly modified catchment. The total watercourse length is 0.5km, and the elevation changes from 5m to 20m.
Catchment Geology and Soils	Catchment geology is sandstone. Catchment soil is slightly acid loamy and clayey soils with impeded drainage.

Watercourse name	Seahill Tributary 2
Catchment Hydrology	No gauge records are available for this catchment.
Historical Channel Change	No change in planform can be seen from existing online maps (from 1982 onwards).
Biological	
Fish	Scoped out due to lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.

Watercourse name	Seahill Tributary 2
Priority Hazardous Substances	No data is available for this watercourse.
<u>Hydromorphological</u>	
Quantity and Dynamics of Flow	Narrow tributary of main drain running through pasture. The flow is slow and, in some sections, not perceptible.
River Continuity	The watercourse does not experience any artificial impoundment throughout the study area.
River Depth and Width Variation	Watercourse geometry is minimal throughout the study area. Water width is ~ 0.5m, and water depth is ~ 0.02m.
Structure and Substrate of the River Bed	The bed is dominated by silt particles and low morphological diversity.
Structure of the Riparian Zone	The riparian zone is primarily arable agriculture.

SEAHILL DRAIN

Baseline data for Seahill Drain

Watercourse name	Seahill Drain
	Water feature type: Main River Catchment area: 3.03km² Key hydraulic connections: This watercourse has several tributaries and merges with the Garden City Gutter before reaching the River Dee. Surrounding land use: Arable agriculture and permanently vegetated recreational. River Condition Score: Fairly poor
Catchment Characteristics	Catchment with high degree of human influence on watercourses and landscape. Elevation varies from ~ 25m to 5m.
Catchment Geology and Soils	Catchment geology is sandstone and conglomerate. Catchment soil is slightly acid loamy and clayey soils with impeded drainage.
Catchment Hydrology	No gauge records are available for this catchment.

Watercourse name	Seahill Drain
Historical Channel Change	No change in planform can be seen from existing online maps (from 1982 onwards).
<u>Biological</u>	
Fish	The e-DNA from four species of coarse fish were detected in the sample collected from within the proposed Order Limits on 17 February 2022. This included one SPI, the European eel, and one INNS, the Eurasian or common/Amur carp *Cyprinus carpio/Cyprinus rubrofuscus* (species level could not be determined during e-DNA analysis).Although introduced, common carp are considered a naturalised species.
Invertebrates	Invertebrate sampling was undertaken within the proposed Order Limits on 09 April and 20 September 2021. Results indicated that the site had low (spring sample) to moderate (autumn sample) conservation value, with the predominant presence of scoring taxa primarily associated with slow flowing/standing water. There was slight dominance by pollution tolerant taxa in both samples.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
<u>Physico-Chemical</u>	

Watercourse name	Seahill Drain
Thermal Conditions	When sampled on 09 April and 20 September 2021, the water temperature recorded was 8.2°C and 14.5°C, respectively. No long-term monitoring data is available for this watercourse.
Oxygenation Conditions	When sampled on 09 April and 20 September 2021, the recorded dissolved oxygen level was 11.22mg/L (95.5% saturation) and 11.1mg/L (saturation level not recorded). No long-term monitoring data is available for this watercourse.
Salinity	When sampled on 09 April and 20 September 2021, salinity was recorded as 0.43 ppt and 0.54 ppt, respectively. No long-term monitoring data is available for this watercourse.
Acidification Status	When sampled on 09 April and 20 September 2021, pH was recorded as 8.18 and 7.09, respectively. No long-term monitoring data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	Linear watercourse, with constant type of flow and poor morphological diversity. The watercourse is artificially modified to drain the natural floodplain and channel flood flows to the Dee.

Watercourse name	Seahill Drain
River Continuity	River continuity is good as there are no artificial or natural impoundments through the study area. The watercourse is disconnected from its floodplain due to an artificially incised channel.
River Depth and Width Variation	Water depth and width do not vary significantly along the investigated reach. Mean water depth and width are 0.45m and 2.1m, respectively.
Structure and Substrate of the River Bed	The riverbed morphology is slow-glide with silt as the dominant particle size.
Structure of the Riparian Zone	Arable agriculture and permanently vegetated recreational.

SANDYCROFT DRAIN

RAILWAY DITCHES

Baseline data for Railway Ditches

Watercourse name	Railway Ditches
	Water feature type: Ordinary Watercourse Catchment area: <1km^2 Key hydraulic connections: The railway ditches are ephemeral. It is assumed that they connect to Hawarden Brook which flows northwards to the Dee Estuary. Surrounding land use: Predominantly arable and horticultural land use, with some urban development. Ditch Condition Score: Poor
Catchment Characteristics	Small catchment modified by artificial drains and the railway.
Catchment Geology and Soils	The channel flows over a variety of bedrock geologies, including Kinnerton sandstone formation, Etruria Formation (Mudstone, sandstone and conglomerate) from riverine environments.

Watercourse name	Railway Ditches
	Superficial deposits also include tidal flat deposits (clay, silt and sand). The soils within the catchment comprise loamy and clayey soils of coastal flats with naturally high groundwater.
Catchment Hydrology	Within the study area, the cut channel drains the surrounding road and arable fields and mitigates for the loss of hydraulic connection across the catchment due to the railway embankment. The watercourse is ungauged.
Historical Channel Change	Since 1913, the channel has retained its planform as a cut ditch aside the London and North Wales Railway.
Biological	
Fish	NRW advised that one SPI, European eel, is present in these watercourses. However, both ditches were dry when the aquatic habitat walkover survey was conducted and consequently they have been scoped out of further survey.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.

Watercourse name	Railway Ditches
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	The ditches were dry at the time of survey and therefore are ephemeral. It is likely flow is not perceptible when water is present.
River Continuity	The channels are dry ditches, with little flow continuity. The ditches are cut to drain the landscape and therefore are not well connected to the floodplain.
River Depth and Width Variation	These are small ditches which are ephemeral.
Structure and Substrate of the River Bed	Bed material is mostly silt and organic matter.
Structure of the Riparian Zone	A lack of emergent, submerged and floating leaved plants. An absence of marginal vegetation along most of the ditches. There is a railway embankment on one side of the ditch and farmland on the other side, therefore a heavily modified riparian zone.

BROUGHTON BROOK

Baseline data for Broughton Brook

Watercourse name	Broughton Brook
	Water feature type: Main River
	Catchment area: 11.72km^2
	Key hydraulic connections: The Broughton Brook flows south of Hawarden towards Broughton. Along the B5129 it flows northwards towards Station Road where it flows to the River Dee. Along the B5129 it is joined by several tributaries flowing north-eastwards from Hawarden. There are drains along Chester Road which connect to the Broughton Brook prior to it joining the River Dee.
	Surrounding land use: within the Newbuild Infrastructure Boundary the surrounding land use is arable farming. Land comprises improved grassland, some broadleaved, mixed and yew woodland, arable and horticultural land, urban and suburban settlements.
	River Condition Score: Fairly Poor
Catchment Characteristics	The catchment has a high degree of human influence on watercourses and the landscape. Elevation varies from ~ 157m to 8m.
Catchment Geology and Soils	The channel flows over a variety of bedrock geologies, including Kinnerton sandstone formation, Etruria Formation (Mudstone, sandstone and conglomerate) from riverine environments. The channel is also underlain by bedrock geologies of Pennine Middle and Lower

Watercourse name	Broughton Brook
	Coal Measures Formation - Mudstone, Siltstone and Sandstone, from swamps, estuarine and delta environments, Bowland Shale Formation (Mudstone, formed in open seas with pelagite deposits), and Gwespyr Sandstone formed within swamps, estuaries, and deltas. Superficial deposits also include tidal flat deposits (clay, silt and sand), Devensian tills, glaciofluvial deposits, and head deposits of clay, silt, sand, and gravel from subaerial slopes. The soils within the catchment comprise Freely draining slightly acid loamy soils, slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils and Loamy and clayey soils of coastal flats with naturally high groundwater.
Catchment Hydrology	Within the study area, the cut channel drains the surrounding road and arable fields. The channel has been artificially straightened. The watercourse is ungauged.
Historical Channel Change	Since 1913, the channel has retained its planform as a cut road-side ditch within the study area.
<u>Biological</u>	
Fish	NRW advised that two SPIs, European eel and brown trout, are present within Broughton Brook. An e-DNA sample collected from within the proposed Order Limits on 16 February 2022 yielded similar results, with

Watercourse name	Broughton Brook
	e-DNA from ten species of fish detected. This included European eel and brown/sea trout, and one INNS, the Eurasian/Amur carp (species level could not be determined during e-DNA analysis). Although introduced, common carp are considered a naturalised species.
Invertebrates	Invertebrate sampling was undertaken on 07 September 2021 and 02 March 2022. Results indicated that the site had low (autumn sample) to fairly high (spring sample) conservation value, with the predominant presence of scoring taxa primarily associated with a sedimented watercourse and slow/sluggish flows. There was no strong dominance by pollution tolerant or intolerant taxa in either sample. One species of regional conservation importance, the red legged moss beetle *Hydraenia rufipes,* was identified in the spring sample.
Macrophytes & Phytoplankton	Macrophytes were present in the watercourse, however a full survey could not be completed due to health and safety issues imposed by the busy A road that runs adjacent to Broughton Brook. Consequently, no baseline data is available for this watercourse. Macrophytes and phytoplankton have remained scoped in as a precautionary measure.
<u>Physico-Chemical</u>	
Thermal Conditions	When sampled on 07 September 2021 and 02 March 2022, the water temperature was 13.9°C and 7.3°C, respectively. No long-term data is available for this watercourse.
Oxygenation Conditions	When sampled on 7 September 2021 and 02 March 2022, the recorded dissolved oxygen level was 11.33mg/L (109.9% saturation) and

Watercourse name	Broughton Brook
	11.47mg/L (95.5% saturation), respectively. No long-term monitoring data is available for this watercourse.
Salinity	When sampled on 7 September 2021 and 02 March 2022, salinity was recorded as 0.51 ppt and 0.34 ppt, respectively. No long-term monitoring data is available for this watercourse
Acidification Status	When sampled on 02 March 2022, pH was recorded as 8. No long-term monitoring data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	At the time of survey, the watercourse demonstrated smooth flows.
River Continuity	River continuity is good as there are no artificial or natural impoundments through the study area. There are some culverted sections where the channel flows beneath roads and residential areas. The watercourse is disconnected from its floodplain is it is within an incised channel.
River Depth and Width Variation	The channel is a cut trapezoidal drainage ditch. Bankfull width and water depth is consistent (2m and 0.25m respectively).

Watercourse name	Broughton Brook
Structure and Substrate of the River Bed	The bed material is predominantly silt with some gravels and pebbles. The watercourse has a bare channel bed, with some emergent reeds/ linear leaved or horsetails.
Structure of the Riparian Zone	Within the study area there are taller grasses on bank face and bank top, some broad leaved species but mostly grasses. On one bank is the B5129 and the other bank is arable farming. The channel and its riparian zone is homogenous through the study area.

SANDYCROFT DRAIN

Baseline data for Sandycroft Drain

Watercourse name	Sandycroft Drain
	Water feature type: Main River and ordinary watercourse Catchment area: 2.99km^2 Key hydraulic connections: Onward connection into Broughton Brook. It receives flows from roadside ditches of Moor Lane. Surrounding land use: arable and horticultural River Condition Score: Fairly Poor
Catchment Characteristics	Catchment with high degree of human influence on watercourses and landscape. Elevation varies from 80 - 8 mAOD. Relatively flat catchment.
Catchment Geology and Soils	The channel flows over a variety of bedrock geologies, including Kinnerton sandstone formation, Etruria Formation (Mudstone, sandstone and conglomerate) from riverine environments. The channel is also underlain by bedrock geologies of Pennine Middle Coal

Watercourse name	Sandycroft Drain
	Measures Formation - Mudstone, Siltstone and Sandstone, from swamps, estuarine and delta environments Superficial geologies consisting of Devensian tills form ice age conditions, and tidal flat deposits. Soils comprised of slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils and loamy and clayey soils of coastal flats with naturally high groundwater.
Catchment Hydrology	Within the study area, the cut channel drains the surrounding roads, urban areas, and arable fields. The channel appears to have been artificially straightened and flows through a culvert as it passes under the B5129. The watercourse is ungauged.
Historical Channel Change	Since 1913, the channel has retained its planform as a cut road-side ditch within the study area.
Biological	
Fish	Scoped out due to lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Invertebrate sampling was undertaken within the proposed Order Limits on 25 May 2022. Results indicated that the site had moderate conservation value, with the predominant presence of scoring taxa primarily associated with a sedimented watercourse and

Watercourse name	Sandycroft Drain
	flowing/standing water. There was no dominance by pollutant tolerant or intolerant taxa.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse. No long-term monitoring data is available for this watercourse.
Oxygenation Conditions	When sampled on 05/05/2022, the dissolved oxygen level was recorded as 10.29mg/L (94.7% saturation). No long-term monitoring data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	When sampled on 05/05/2022, pH was recorded as 8.50. No long-term monitoring data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	The watercourse is ephemeral. When water is present, no perceptible flow is likely.

Watercourse name	Sandycroft Drain
River Continuity	The watercourse is a cut ditch to aid the drainage of farm land, therefore it is disconnected from its floodplain. There are no impoundments to the watercourse however it passes through a culvert to join Broughton Brook.
River Depth and Width Variation	Cut trapezoidal drainage ditch with bankfull width and water depth consistent (1m and 0.05m, respectively).
Structure and Substrate of the River Bed	Predominantly silt with some sands. The channel bed sediment is bare, with some emergent broadleaved and amphibious plants.
Structure of the Riparian Zone	There are taller grasses on the bank face and bank top, with some broad leaved species. The riparian zone is homogenous. There is hedgerow between the channel and the adjacent pastoral fields. The majority of the riparian zone is fields or road infrastructure.

MANCOT BROOK

Baseline data for Mancot Brook

Watercourse name	Mancot Brook
 Downstream reach	Water feature type: Ordinary Watercourse
	Catchment area: 1.66km^2
	Key hydraulic connections: Onward connection into Chester Road Drain South, which flows beneath the B5129 to join the Broughton Brook.
	Surrounding land use: The watercourse primarily flows through pasture. This comprises improved and neutral grassland, broadleaved, mixed and yew woodland.
	River Condition Score: Moderate

Watercourse name	Mancot Brook
 Upstream reach	
Catchment Characteristics	The catchment drains farmland and arable fields. Elevation varies from 80 - 8mAOD. Relatively flat catchment which is predominantly rural.
Catchment Geology and Soils	The channel flows over a variety of bedrock geologies, including Kinnerton sandstone formation, Etruria Formation (Mudstone, sandstone and conglomerate) from riverine environments. The channel is also underlain by bedrock geologies of Pennine Middle and Lower Coal Measures Formation - Mudstone, Siltstone and Sandstone, from swamps, estuarine and delta environments, Bowland Shale Formation (Mudstone, formed in open seas with pelagite deposits), and Gwespyr Sandstone formed within swamps, estuaries, and deltas. Superficial deposits also include tidal flat deposits (clay, silt and sand), Devensian tills, and glaciofluvial deposits.

Watercourse name	Mancot Brook
	Soils consisting of slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.
Catchment Hydrology	Within the study area, the cut channel drains the surrounding pastures. The channel appears to have been artificially straightened to follow the line of field boundaries.
Historical Channel Change	Since 1913, the channel has retained its planform as a drainage channel to the surrounding arable land. The channel has been elongated to follow field boundaries, therefore resulting in a shallower gradient compared to its likely natural state.
Biological	
Fish	Scoped out due to lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Invertebrate sampling was undertaken within the proposed Order Limits on 05 May 2022. Results indicated low conservation value, with the predominant presence of scoring taxa primarily associated with a sedimented watercourse and slow flowing/standing water. There was no strong dominance by pollution tolerant or intolerant taxa in either sample.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	

Watercourse name	Mancot Brook
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	When sampled on 05 May 2022, the dissolved oxygen level was recorded as 10.07mg/L (107.2% saturation). No long-term monitoring data is available for this watercourse.
Salinity	When sampled on 05 May 2022, salinity was recorded as 0.38 ppt. No long-term monitoring data is available for this watercourse.
Acidification Status	When sampled on 05 May 2022, pH was recorded as 8.55. No long-term monitoring data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	Rippled flows further upstream at proposed open cut location where the gradient is steeper, with smooth flows further downstream where another proposed open cut is located.
River Continuity	The channel is incised in places but is also connected to the floodplain in other areas within the Newbuild Infrastructure Boundary.
River Depth and Width Variation	Bankfull channel width varies between 1.5-3m, whilst water depth is between 0.05 – 0.07m.

Watercourse name	Mancot Brook
Structure and Substrate of the River Bed	The channel has a silt substrate with extensive cover of bare earth. Some broad and linear leaved aquatic vegetation is present.
Structure of the Riparian Zone	At the location of the upstream proposed open cut crossing the right bank is lined with a hedge row, infilled with tall grasses. The riparian zone is dominated by short grassland pasture. At the downstream proposed crossing location there is a hedge along the left bank and a private drive on the right bank.

CHESTER ROAD DRAIN NORTH

Baseline data for Chester Road Drain North

Watercourse name	Chester Road Drain North
	Water feature type: Main River
	Catchment area: 1.67km^2
	Key hydraulic connections: This watercourse is a drain for the local area which is hydraulically connected to both the Broughton Brook (southeast) and Aston Hall Brook (Northwest). The direction of flow is not known as flow was not perceptible during time of survey and lidar data shows ground levels are very flat in this area.
	Surrounding land use: Mostly suburban (residential and industrial) land use but receiving flows from watercourses which flow through rural areas.
	River Condition Score: Poor
Catchment Characteristics	The catchment drains farmland and arable fields. Elevation varies from 80 – 8mAOD. Relatively flat catchment with extensive urbanisation north of the watercourse.
Catchment Geology and Soils	The channel flows over bedrock geologies, including Etruria Formation (mudstone, sandstone and conglomerate) from riverine environments. The channel is also underlain by bedrock geologies of Pennine Middle

Watercourse name	Chester Road Drain North
	Coal Measures Formation - Mudstone, Siltstone and Sandstone, from swamps, estuarine and delta environments. Superficial deposits of Tidal Flat Deposits – comprising clay, Silt and Sand. Soils comprised of Loamy and clayey soils of coastal flats with naturally high groundwater.
Catchment Hydrology	Within the study area, the cut channel drains the surrounding arable fields, local housing estates, and industrial estate. The channel has been artificially straightened and culverted as it passes under the B5129 and industrial property. The watercourse is ungauged.
Historical Channel Change	The channel has retained its contemporary planform since at least 1892. The channel has become progressively more culverted as the areas has urbanised, with private gardens paving over the watercourse.
Biological	
Fish	Suitable fish habitat was identified during the aquatic habitat walkover survey. However, fish surveys could not be conducted due to health and safety and access issues arising from the steep, densely vegetated banks. Fish have remained scoped in as a precautionary measure.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.

Watercourse name	Chester Road Drain North
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	No perceptible flows were noted during the survey. This is due to the shallow long-profile gradient.
River Continuity	Large sections of this watercourse are culverted or in an artificially incised channel with steep banks. Therefore, the channel is not connected to the floodplain. There are no impoundments other than culverts.

Watercourse name	Chester Road Drain North
River Depth and Width Variation	There is no variation in channel width (bankfull width 4m) and depth (0.3m) within the study area. The channel has steep banks.
Structure and Substrate of the River Bed	The watercourse has a silt substrate. There is a lack of diversity within the channel, comprising a flat channel bed and lack of geomorphic bed features.
Structure of the Riparian Zone	In the open sections, there is defunct hedgerow on the bank top with road and car parking within the riparian zone. there is bare earth on the bank faces, with some short creeping herbs and grasses. There is a lack of diversity in riparian vegetation.

CHESTER ROAD DRAIN TRIBUTARY 1

Baseline data for Chester Road Drain Tributary 1

Watercourse name	**Chester Road Drain Tributary 1**
	Water feature type: Main River Catchment area: <1km^2 Key hydraulic connections: Onwards connection to Chester Road Drain North. Surrounding land use: Arable fields, roadway, urban areas. River Condition Score: Fairly Poor
Catchment Characteristics	Catchment drains farmland and arable fields as well as urban areas. Elevation varies from 80 - 8mAOD. It has a relatively flat catchment with extensive urbanisation to the north of the watercourse.
Catchment Geology and Soils	The channel flows over bedrock geologies, including Etruria Formation (Mudstone, sandstone and conglomerate) from riverine environments. The channel is also underlain by bedrock geologies of Pennine Middle

Watercourse name	Chester Road Drain Tributary 1
	Coal Measures Formation - Mudstone, Siltstone and Sandstone, from swamps, estuarine and delta environments. Superficial deposits of Tidal Flat Deposits – comprising clay, Silt and Sand. Devensian Tills are also present within the catchment. Soils comprised of loamy and clayey soils of coastal flats with naturally high groundwater. The channel also drains Loamy and clayey soils of coastal flats with naturally high groundwater.
Catchment Hydrology	Within the study area, the cut channel drains the surrounding arable fields, local housing estates, and industrial estate. The channel has been artificially straightened and culverted as it passes under the B5129 and Mancot Lane. The watercourse is ungauged.
Historical Channel Change	The channel has retained its contemporary planform since at least 1892. The channel has become progressively more culverted as the areas has urbanised.
Biological	
Fish	NRW advised that one SPI, European eel, is present in this watercourse. e-DNA from two species of fish was detected in the sample collected from within the proposed Order Limits on 16 February 2022, one of which was European eel (SPI). No INNS were detected.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.

Watercourse name	Chester Road Drain Tributary 1
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	At the time of the survey there was no perceptible flows.
River Continuity	The channel is culverted at its confluence with Chester Road Drain North. The channel has a rectangular cross section and is disconnected from its floodplain.
River Depth and Width Variation	The channel has a consistent bankfull river width of 2.5m and water depth of 0.25m.

Watercourse name	Chester Road Drain Tributary 1
Structure and Substrate of the River Bed	The channel has a predominantly silt substrate with a lack of geomorphic diversity and bedforms.
Structure of the Riparian Zone	The channel and a roadside drain with short creeping herbs and grasses on both banks and some taller vegetation on the southern bank. The south bank has arable farmland within the riparian zone, whilst the right bank has road infrastructure.

WEPRE BROOK

NEW INN BROOK

Baseline data for New Inn Brook

Watercourse name	New Inn Brook
	Water feature type: Ordinary Watercourse Catchment area: 2.68km^2 Key hydraulic connections: Downstream connectivity to Wepre Brook Surrounding land use: Predominantly rural landscape with some residential and agricultural buildings. land cover comprising broadleaved, mixed and yew woodland, improved grassland and pasture. River Condition Score: Fairly Good
Catchment Characteristics	The catchment drains farmland and arable fields. Elevation varies from 166 - 62mAOD. There is extensive urbanisation in the upper catchment(Buckley) and more rural land use in the lower catchment before connecting to the Wepre Brook.

Watercourse name	New Inn Brook
Catchment Geology and Soils	The bedrock geology of the catchment comprises Pennine Middle Coal Measures Formation (Mudstone, Siltstone And Sandstone), Hollin Rock (Sandstone), Gwespyr (sandstone), Bowland Shale Formation (mudstone), Pennine Lower Coal Measures Formation (Mudstone, Siltstone and Sandstone), Etruria Formation (Sandstone). The superficial geology consists of Devensian tills, alluvium (clay, silt, sand and gravel), glaciofluvial deposits, and head (clay, silt, sand and gravel). The catchment consists of slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils and slowly permeable seasonally wet acid loamy and clayey soils.
Catchment Hydrology	The watercourse is ungauged.
Historical Channel Change	Through the study area, the channel has retained a similar planform since 18988. The channel has been culverted where developments have been implemented (post 1949).
<u>Biological</u>	
Fish	NRW advised that one SPI, brown trout, is present in New Inn Brook. The reach within the proposed Order Limits was however scoped out of further survey due to a lack of suitable fish habitat identified during the aquatic habitat walkover survey.

Watercourse name	New Inn Brook
Invertebrates	Invertebrate sampling was undertaken on 09 September 2021 and 03 March 2022. Results indicated low conservation value, with the predominant presence of scoring taxa primarily associated with a sedimented watercourse and slow flows and/or standing water. There was no strong dominance by pollutant tolerant or intolerant taxa.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	When sampled on 09 September 2021 and 03 March 2022, the water temperature was 14.6°C and 7.8°C, respectively. No long-term monitoring data is available for this watercourse.
Oxygenation Conditions	When sampled on 09 September 2021 and 03 March 2022, the dissolved oxygen level was recorded as 5.94mg/L (58.5% saturation) and 9.59mg/L (80.8% saturation), respectively. No long-term monitoring data is available for this watercourse.
Salinity	When sampled on 09 September 2021 and 03 March 2022, salinity was recorded as 0.42 ppt and 0.44 ppt, respectively. No long-term monitoring data is available for this watercourse.
Acidification Status	When sampled on 09 September 2021 and 03 March 2022, pH was recorded as 8.85 and 7.51, respectively. No long-term monitoring data is available for this watercourse.

Watercourse name	New Inn Brook
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
<u>Hydromorphological</u>	
Quantity and Dynamics of Flow	Within the study area the watercourse has predominantly smooth flow with some sections of rippled flow where the gradient steepens.
River Continuity	The watercourse is culverted where the channel flows beneath the road network. There is no impoundment of the watercourse upstream of the Wepre Brook. In the study area the watercourse is connected to the floodplain on the left bank.
River Depth and Width Variation	The watercourse has shallow channel banks, a bankfull width around 0.7m and channel depth around 0.2m. At the downstream end of the reach within the Newbuild Infrastructure Boundary the watercourse becomes multi-thread.
Structure and Substrate of the River Bed	The channel has predominantly a silt substrate with some clays and sands. The channel bed has some linear leaved vegetation growing at the margins. The channel is highly shaded and the channel bed is covered in fine layer of debris.
Structure of the Riparian Zone	The left bank is dominated by long grassy vegetation, shrubs and scrub. The riparian zone on the left bank is historically pasture which has been left unused and has therefore grown more mature

Watercourse name	New Inn Brook
	vegetation. On the right bank the riparian zone includes mixed hedgerow and arable fields.

ALLTAMI BROOK

Baseline data for Alltami Brook

Watercourse name	Alltami Brook
	Water feature type: Ordinary Watercourse Catchment area: 6.52km^2 Key hydraulic connections: the Alltami Brook joins Wepre Brook downstream of the Newbuild Infrastructure Boundary. Surrounding land use: Predominantly rural settlement and pastoral farming. There is a clay quarry in the upper catchment. Land cover is mostly improved grassland, settlement, broadleaved, mixed and yew woodland, arable and horticultural fields. River Condition Score: Fairly Good
Catchment Characteristics	The catchment drains farmland and arable fields. Elevation varies from 170 - 76mAOD. There is extensive urbanisation in the upper catchment (Buckley, New Brighton). Downstream the watercourse flows through a narrow gorge to Wepre Brook. There is a clay quarry within the catchment.
Catchment Geology and Soils	The bedrock geology of the catchment comprises Pennine Middle Coal Measures Formation (Mudstone, Siltstone and Sandstone),

Watercourse name	Alltami Brook
	Hollin Rock (Sandstone), Gwespyr (sandstone), Bowland Shale Formation (mudstone), Pennine Lower Coal Measures Formation (Mudstone, Siltstone and Sandstone), Etruria Formation (Sandstone). The superficial geology consists of Devensian tills, alluvium (clay, silt, sand and gravel), and glaciofluvial deposits (sand and gravel). The soils within the catchment comprise slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils. The catchment also contains slowly permeable seasonally wet acid loamy and clayey soils.
Catchment Hydrology	The watercourse is ungauged. The watercourse drains a predominantly rural catchment. The Alltami Brook has approximately 10 tributaries upstream of the study area. It forms part of the Wepre Brook catchment.
Historical Channel Change	The watercourse has retained a similar plan form since 1892. However, the construction of the A55 involved modifying the channel planform to culvert the channel beneath the road. Immediately downstream of the A55 culvert the channel is straightened for 250m. Downstream of this it follows the alignment as shown in 1892 mapping. The catchment has become progressively more urbanised and industrialised.
Biological	

Watercourse name	Alltami Brook
Fish	NRW advised that two SPIs, European eel and brown trout, are present within Alltami Brook. e-DNA from five species of fish was detected in the sample collected on 16 February 2022, including European eel (SPI), and the INNS Eurasian/Amur carp (species level could not be determined during e-DNA analysis). Although introduced, common carp are considered a naturalised species. No salmonid e-DNA was detected in the sample.
Invertebrates	Invertebrate sampling was undertaken on 02 March 2022. Results indicated low conservation value, with the predominant presence of scoring taxa primarily associated with a slightly sedimented watercourse slow/sluggish flows. There was no strong dominance by pollutant tolerant or intolerant taxa.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
<u>Physico-Chemical</u>	
Thermal Conditions	When sampled on 02 March 2022, the water temperature was 6.6℃. No long-term monitoring data is available for this watercourse.
Oxygenation Conditions	When sampled on 02 March 2022, the dissolved oxygen level was recorded as 12.06mg/L (98.5% saturation). No long-term monitoring data is available for this watercourse.

Watercourse name	Alltami Brook
Salinity	When sampled on 02 March 2022, salinity was recorded as 0.33 ppt. No long-term monitoring data is available for this watercourse.
Acidification Status	When sampled on 02 March 2022, pH was recorded as 8.81. No long-term monitoring data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
<u>Hydromorphological</u>	
Quantity and Dynamics of Flow	Through the study area the watercourse flows through a fairly steep bedrock reach. There is a variety of bed material and channel width, therefore flow dynamics are varied, demonstrating smooth, rippled, unbroken and broken standing waves and chute flow.
River Continuity	The watercourse flows through a naturally deep valley and therefore is not connected to a floodplain. The watercourse is culverted under the A55, downstream of which is an apron lip which provides some disconnection during low flows for fish passage.
River Depth and Width Variation	Bankfull width is varied between 6 – 7m and water depth varies between 0.2 – 0.3m. There is varied roughness through the reach which has pools, riffles, steps and glides. There is some active bank erosion with undercut banks within the study reach.

Watercourse name	Alltami Brook
Structure and Substrate of the River Bed	The predominant structure of the river bed is bedrock which is overlain with some boulders, cobble, gravel and silts, with some bedrock outcrops throughout the reach. The Alltami Brook has an unvegetated channel bed. There was no aquatic vegetation noted during the survey and the channel is extensively shaded channel.
Structure of the Riparian Zone	The banks are mostly bare showing exposed bedrock and earth. There are some mosses and lichens, with short herbs and grasses on the lower banks and saplings and trees on the upper banks. There is evidence of bank erosion, as trees are leaning and some trees have fallen across the channel and on the bank top. On the bank top the riparian zone comprises mature woodland on the left bank and pasture on the right bank.

WEPRE BROOK

Baseline data for Wepre Brook

Watercourse name	Wepre Brook
 **Wepre Brook A55 reach**	Water feature type: Ordinary watercourse within the Newbuild Infrastructure Boundary. It becomes a Main River downstream of its confluence with Alltami Brook.
	Catchment area: 9.57km^2
	Key hydraulic connections: Wepre Brook has several tributaries, mostly from the south of the catchment. The Alltami Brook and New Inn Brook both connect to the Wepre Brook downstream of the study area.
	Surrounding land use: Predominantly rural and agricultural land use. The A55 and Brookside run parallel to the Wepre Brook through the study reach. There are residential areas north of the watercourse through the study reach.
	River Condition Score: A55 reach: **moderate;** Brookside reach: **fairly poor;** Northrop Hall reach: **fairly poor**

Watercourse name	Wepre Brook
 **Wepre Brook Brookside reach**  **Wepre Brook, Northop Hall reach**	

Watercourse name	Wepre Brook
Catchment Characteristics	The majority of the catchment is rural and agricultural. There are small settlements in the catchment (Northop, Northop Hall and Soughton).
Catchment Geology and Soils	Bedrock geology consists of the Pennine Lower Coal Measures Formation - Mudstone, Siltstone And Sandstone. Superficial geology largely composed of Devensian till and diamicton, with small areas of alluvium close to the confluence with the Alltami Brook.
Catchment Hydrology	No gauging station located within catchment.
Historical Channel Change	Some minor course changes (including culverts) for construction of the A55 road and Brookside junction, but largely the same course as depicted on the 1st edition OS maps (1888)
<u>Biological</u>	
Fish	NRW advised that one SPI, brown trout, is present within Wepre Brook. e-DNA from six species of coarse fish was detected in the sample collected on 16 February 2022, including two INNS; Wels catfish *Silurus glanis* and Eurasian/Amur carp (species level could not be determined during e-DNA analysis). Although introduced, common carp are considered a

Watercourse name	Wepre Brook
	naturalised species. No e-DNA from protected species were detected in the sample.
Invertebrates	Invertebrate sampling was conducted on 09 September 2021 and 02 March 2022. Results indicated low (autumn sample) to fairly high (spring sample) conservation value. The predominant presence of scoring taxa was primarily associated with a sedimented to moderately sedimented watercourses and slow flows. There was no strong dominance by pollutant tolerant or intolerant taxa
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
<u>Physico-Chemical</u>	
Thermal Conditions	When sampled on 09 September 2021 and 02 March 2022, the water temperature was 15°C and 6.4°C, respectively. No long-term monitoring data is available for this watercourse.
Oxygenation Conditions	When sampled on 09 September 2021 and 02 March 2022, the dissolved oxygen level was recorded as 3.20 mg/L (31.8% saturation) and 11.24mg/L (91.4%

Watercourse name	Wepre Brook
	saturation), respectively. No long-term monitoring data is available for this watercourse.
Salinity	When sampled on 09 September 2021 and 02 March 2022, the salinity was recorded as 0.54 ppt and 0.24 ppt, respectively. No long-term monitoring data is available for this watercourse.
Acidification Status	When sampled on 09 September 2021 and 02 March 2022, pH was recorded as 11.94 and 7.64, respectively. No long-term monitoring data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	Flow generally rippled throughout surveyed reaches due to steep gradient and varied bed material.
River Continuity	The watercourse is culverted beneath the A55 and the Brookside junction. The valley is fairly steep through the study reach therefore there is no floodplain to which the watercourse would be connected.

Watercourse name	Wepre Brook
River Depth and Width Variation	At the A55 reach the channel is narrow (approximately 1m width and 0.3m water depth). Through Brookside and Northop Hall reaches the watercourse is wider (width up to 2m and water depth 0.2m)
Structure and Substrate of the River Bed	Bed is well mixed generally, with areas of both gravel-pebble mix and cobbles. Some areas of sand are observed overlaying armoured substrate in the A55 reach.
Structure of the Riparian Zone	At the A55 reach the left bank is short grass pasture for grazing whilst the right bank is plantation woodland and scrub. Through Brookside and Northop Hall there are more mature trees on both banks. There are gabion baskets supporting the right bank through the Brookside reach. The riparian zone through the Northop Hall reach is more substantial than other reaches.

NANT-Y-FFLINT

Watercourse name	Nant-y-Fflint
	Water feature type: Ordinary watercourse Catchment area: 4.31km^2 Key hydraulic connections: The Nant-y-Fflint has several unnamed tributaries mostly from the south of the catchment which join the watercourse upstream of the DCO Proposed Development. Surrounding land use: Mainly rural farmland (arable and pastoral, forestry) River Condition Score: Fairly Good
Catchment Characteristics	The catchment is relatively steep, with a confined floodplain in a wooded valley. The catchment is predominantly rural with small settlements in Pentre Halkyn and Halkyn.
Catchment Geology and Soils	Somewhat complex bedrock geology, consisting of areas of mudstone and sandstone from different formations. Superficial deposits poorly recorded in this

Watercourse name	Nant-y-Fflint
	area, but evidence of glacial till and small areas of alluvium in the downstream reaches.
Catchment Hydrology	No gauge recorded in the catchment. The steepness of valley suggests this is likely a flashy catchment.
Historical Channel Change	No significant areas of channel change recorded since 1st edition OS maps (1888)
Biological	
Fish	Scoped out due to lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Invertebrate sampling was conducted within the proposed Order Limits on 16 June 2022. Results indicated that the site is of low conservation value, with the predominant presence of scoring taxa primarily associated with slightly sedimented watercourses and slower flows. There was no strong dominance by pollution tolerant or intolerant taxa.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte habitat identified during the aquatic habitat walkovers.
Physico-Chemical	

Watercourse name	Nant-y-Fflint
Thermal Conditions	When sampled on 16 June 2022, the water temperature was recorded as 13.8°C. No long-term monitoring data is available for this watercourse.
Oxygenation Conditions	When sampled on 16 June 2022, the dissolved oxygen level was recorded as 4.21mg/L (40.9% saturation). No long-term monitoring data is available for this watercourse.
Salinity	No data available for this watercourse.
Acidification Status	When sampled on 16 June 2022, the pH was recorded as 7.68. No long-term monitoring data is available for this watercourse.
Nutrient Conditions	No data available for this watercourse.
Priority Hazardous Substances	No data available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	Primarily rippled flow, with some areas of smooth flow. Due to gradient of channel and typology there is potential for the channel to experience more turbulent flow types in periods of spate.

Watercourse name	Nant-y-Fflint
River Continuity	No impoundments or other structures impeding continuity in surveyed reach. The watercourse is culverted beneath Cornist Lane.
River Depth and Width Variation	Bankfull width varies between 10m and 15m, with the surveyed wetted channel approximately 5m in width. Water depth is relatively shallow, between 0.1m and 0.2m in the surveyed reach.
Structure and Substrate of the River Bed	Channel characteristic of steeper typologies, with step pool systems composed of cobbles and boulders, mixed with gravel and pebbles throughout surveyed reach.
Structure of the Riparian Zone	Wooded valley, heavily vegetated at time of survey.

DEE (N. WALES)

DEE ESTUARY

Baseline data for Dee Estuary

Watercourse name	Dee Estuary
	Water feature type: Transitional Catchment area: 136.7km^2 Key hydraulic connections: Surrounding land use: Rural, industrial, urban River Condition Score:
Catchment Characteristics	Major estuary with extensive mudflats and saltmarsh habitat, with entire estuary area designated as a SAC, SSSI and SPA. Land use is a mix of rural agriculture, industrial, urban areas (Flint, West Kirby, Neston, Heswall, Connah's Quay and the city of Chester at the historic head of the estuary).

Watercourse name	Dee Estuary
Catchment Hydrology	Estuary is macrotidal, with a 7.7mAOD tidal height on a spring tide and a 4.1mAOD tidal height on a neap tide. Approximately 90% of the estuary area is estimated to dry out in a large spring low tide.
Historical Channel Change	The Dee estuary is considered heavily modified and has been significantly altered in the last few hundred years due to industrialisation. The planform of the estuary has not significantly changed, but the banks have been heavily modified. A tidal weir at Chester (originally constructed in the 11th century) has long changed the natural tidal regime of the estuary, highlighting the heavily modified nature of the watercourse.
Biological	
Fish	Field surveys were conducted on 08-0 March and 07-08 May 2022, with 10 sampling locations surveyed in March, and nine sampling locations surveyed in May 2022. A total of nine fish species were recorded, including two SPI's, sea trout and smelt *Osmerus eperlanus.*
Invertebrates	Surveys were conducted on 08-09 March and 07-08 May 2022. Sample analysis is currently ongoing, and results will be presented when available. Invertebrates will remain scoped in for this watercourse as a precaution.

Watercourse name	Dee Estuary
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte habitat identified during the aquatic habitat walkovers.
<u>Physico-Chemical</u>	
Transparency	Water clarity was noted to be very low when sampled in 08-09 March and 07-08 May 2022. No long-term monitoring data is available.
Thermal Conditions	Temperature ranged from 6.2 -7.6 °C when sampled on 08-09 March 2022 and from 15.3-18.0°C when sampled 07-08 May 2022. No long-term monitoring data was available.
Oxygenation Conditions	Oxygenation conditions were recorded at 10 sampling locations in 08-09 March and 07-08 May 2022; detailed analysis of this data is currently ongoing, however the oxygen levels were recorded as very high at all stations.
Nutrient Conditions	No data was available.
Priority Hazardous Substances	No data was available.
<u>Hydromorphological</u>	
Depth Variation	Unobservable – Dee estuary has significant areas of exposed sand banks and saltmarsh habitat. Depth increasing significantly as it approaches the open sea.

Watercourse name	Dee Estuary
Quality, Structure and Substrate of the Bed	Dee estuary has extensive sand, mud and saltmarsh deposits.
Structure of the Intertidal Zone	Extensive saltmarsh habitat in the upper estuary on the right banks. These give way to extensive sand and mud banks as it approaches the open sea, with ephemeral deeper channels from freshwater input.
Freshwater Zone	Freshwater influence significant near the estuary head. Mean fluvial discharge estimated to be 35m^3/s at Chester Weir.
Wave Exposure	Banks at the mouth of the estuary reduce wave penetration into the estuary, although significant wave action can occur during high spring tides, especially on the English shore. The main source of sediment to the estuary is the Irish Sea, although erosion of the glacial till cliffs and the suspended load of the River Dee provide secondary sources.

HAWARDEN BROOK

Baseline data for Hawarden Brook

Watercourse name	Hawarden Brook
	Water feature type: Main River Catchment area: <1km^2 Key hydraulic connections: The Hawarden Brook discharges to the River Dee. Surrounding land use: The predominant land use is pastoral farming River Condition Score: Not surveyed due to land access restrictions
Catchment Characteristics	This watercourse and a small low-lying catchment which heavily modified by the constriction of the Dee and the draining of the floodplain.
Catchment Geology and Soils	The Kinnerton sandstone formation bedrock underlies the watercourse and it catchment.

Watercourse name	Hawarden Brook
	Superficial deposits also include tidal flat deposits (clay, silt and sand). The soils within the catchment comprise loamy and clayey soils of coastal flats with naturally high groundwater.
Catchment Hydrology	The catchment is small and drains the low-lying land which would naturally be floodplain of the Dee. The catchment is heavily modified by the construction of the Airbus factory and runway.
Historical Channel Change	The channel has mostly remained unchanged since 1988 however the construction of the airfield has resulted in the watercourse being culverted upstream of the railway.
<u>Biological</u>	
Fish	Scoped out due to lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Suitable invertebrate habitat was identified during the aquatic habitat walkover. However, due to land access issues, the watercourse could not be surveyed within the proposed Order Limits or accessed during invertebrate sampling seasons. Therefore, no sampling was undertaken and consequently no ecological baseline was established. Invertebrates remain scoped in for this watercourse as a precaution
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.

Watercourse name	Hawarden Brook
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	No data is available for this watercourse.
River Continuity	The watercourse is culverted beneath the airfield, the B5129 and field access tracks. The watercourse flows through an artificially incised channel and is therefore no connected to its floodplain. There is a structure on the Hawarden Brook immediately upstream of its confluence with the Dee Estuary. This is to prevent tidal flows moving up the Hawarden Brook therefore the watercourse is unable to discharge to the Dee during high tide.
River Depth and Width Variation	Downstream of the B5129 the watercourse flows through a resectioned channel with a trapezoidal cross section.

Watercourse name	Hawarden Brook
Structure and Substrate of the River Bed	The bed material is mostly silt and tidal clays.
Structure of the Riparian Zone	The riparian zone is mostly arable field with long grasses on the channel banks.

WILLOW PARK BROOK

Baseline data for Willow Park Brook

Watercourse name	Willow Park Brook
	Water feature type: Ordinary Watercourse
	Catchment area: 0.55km^2
	Key hydraulic connections: The Willow Park Brook flows north-eastwards to Chester Road Drain North.
	Surrounding land use: The watercourse mostly flows through land used as a petting farm.
	River Condition Score: Upper reach: Fairly poor Lower reach: Moderate
Catchment Characteristics	Relatively small, rural and suburban catchment with mixed land use.
Catchment Geology and Soils	Bedrock composed of Pennine Lower Coal Measures Formation - Mudstone, Siltstone and Sandstone.

Watercourse name	Willow Park Brook
	Superficial geology composed of Glaciofluvial Deposits, Devensian - Sand And Gravel.
Catchment Hydrology	Artificially straightened channel, run-off from agricultural fields and residential estates. There is a small on-line pond in the upper catchment.
Historical Channel Change	Pond more recent than 1st edition OS map (1888). Channel follows same course since at least 1st edition OS map.
<u>Biological</u>	
Fish	NRW advised that one SPI, European eel was present in Willow Park Brook. The reach within the proposed Order Limits was however scoped out of further survey due to a lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Invertebrate sampling was undertaken on 08 September 2021 and 02 March 2022. Results indicated moderate conservation value, with the predominant presence of scoring taxa primarily associated with a sedimented to heavily sedimented watercourse and slow flows. There was no strong dominance by pollutant tolerant or intolerant taxa in spring, but a slight dominance by pollutant tolerant taxa was apparent in the autumn sample.

Watercourse name	Willow Park Brook
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
<u>Physico-Chemical</u>	
Thermal Conditions	When sampled on 08 September 2021 and 02 March 2022, the water temperature was 18.2°C and 7.3°C, respectively. No long-term monitoring data is available for this watercourse.
Oxygenation Conditions	When sampled on 08 September 2021 and 02 March 2022, the dissolved oxygen level was recorded as 7.56mg/L (80.4% saturation) and 11.53mg/L (95.8% saturation), respectively. No long-term monitoring data is available for this watercourse.
Salinity	When sampled on 08 September 2021 and 02 March 2022, the salinity was recorded as 0.36 ppt and 0.31 ppt, respectively. No long-term monitoring data is available for this watercourse.
Acidification Status	When sampled on 08 September 2021 and 02 March 2022, the pH was recorded as 9.62 and 8.04. No long-term monitoring data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.

Watercourse name	Willow Park Brook
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	Small ,shallow channel through farmland. Flow generally smooth with some locations where there is no perceptible flow.
River Continuity	There is a small on-line pond which likely acts to attenuate flow and sediment and limit its movement downstream.
River Depth and Width Variation	Bankfull channel width varies between 1m and 2m. Depth varies between 0.3m and 1.5m.
Structure and Substrate of the River Bed	The substrate primarily comprises gravels and pebbles, with some silt and sand deposits, potentially introduced due to poaching activity.
Structure of the Riparian Zone	The channel is extensively poached, with hardcore/rubble used for partial bank protection on the right bank. Riparian vegetation is mostly short grasses and isolated trees on the right bank with hedgerow on the left bank. The bank top land use is pastoral farming.

ASTON HALL BROOK

Baseline data for Aston Hall Brook

Watercourse name	Aston Hall Brook
	Water feature type: Ordinary Watercourse Catchment area: <0.5km^2 Key hydraulic connections: this watercourse flow north-eastwards towards Deeside. It is joined by two tributaries before joining the Dee. Surrounding land use: Mostly rural farmland and suburban residential River Condition Score: Fairly poor
Catchment Characteristics	Very small ungauged catchment.
Catchment Geology and Soils	Bedrock composed of Pennine Lower Coal Measures Formation - Mudstone, Siltstone And Sandstone. Superficial geology composed of Glaciofluvial Deposits, Devensian - Sand And Gravel.
Catchment Hydrology	No gauges present in catchment. The watercourse is potentially ephemeral.

Watercourse name	Aston Hall Brook
Historical Channel Change	No changes recorded since 1st edition OS map.
<u>Biological</u>	
Fish	Scoped out due to lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
<u>Physico-Chemical</u>	
Thermal Conditions	When sampled on 16 June 2022, the water temperature was 13.8℃. No long-term monitoring data is available for this watercourse.
Oxygenation Conditions	When sampled on 16 June 2022, the dissolved oxygen level was recorded as 4.21mg/L (40.9% saturation). No long-term monitoring data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	When sampled on 16 June 2022, pH was recorded as 7.68. No long-term monitoring data is available for this watercourse.

Watercourse name	Aston Hall Brook
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
<u>Hydromorphological</u>	
Quantity and Dynamics of Flow	Flow observed to be rippled throughout surveyed reach, with some areas of smooth and no perceptible flow.
River Continuity	No impoundments or attenuating features on surveyed reach. The valley is steep so the watercourses is not connected to a floodplain.
River Depth and Width Variation	Shallow water depth of approximately 0.05m at the time of survey. Bankfull width observed to be between 1.5m and 3m. The channel is over deepened by residential owners.
Structure and Substrate of the River Bed	Mainly composed of sand and silt, with some concrete reinforcement on bed through some private gardens.
Structure of the Riparian Zone	On the right bank is short grasses and pastoral farming. The right bank comprises provide gardens with a mixture of vegetation. The channel is heavily shaded in parts.

NORTHOP BROOK

Baseline data for Northop Brook

Watercourse name	Northop Brook
	Water feature type: Ordinary Watercourse Catchment area: 0.98km^2 Key hydraulic connections: Northop Brook flows northwards and becomes the Lead Brook before joining the Dee. Surrounding land use: Mainly rural, with some settlement (village of Northrop) River Condition Score: Moderate
Catchment Characteristics	The catchment is predominantly rural with land used for pastoral and arable farming. The catchment is steep towards the Dee Estuary. The watercourse flows through agricultural land before entering a wooded gorge. There is an artificial lake/reservoir at the lower end of catchment.
Catchment Geology and Soils	Bedrock composed of the Pennine Lower Coal Measures Formation - Mudstone, Siltstone And Sandstone.

Watercourse name	Northop Brook
	Superficial geology composed of both Devensian till and diamicton.
Catchment Hydrology	There are no gauges present in catchment. The watercourse is impounded downstream by an artificial lake/reservoir, although appears to have a limited backwater effect.
Historical Channel Change	1st edition OS map (1888) shows minimal channel changes. The reservoir was also in-situ at this time too.
Biological	
Fish	NRW advised that two SPIs, European eel and brown trout, are present within Northop Brook. e- NRW advised that two SPIs, European eel and brown trout, are present within Northop Brook. A composite water sample was collected within the proposed Order Limits on 31 May 2022 for e-DNA analysis, however, the sample failed to amplify. Therefore, no baseline data could be obtained.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes & Phytoplankton	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Physico-Chemical	
Thermal Conditions	No data is available for this watercourse.

Watercourse name	Northop Brook
Oxygenation Conditions	No data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	No data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	Flow is generally rippled, with some areas of smooth flow through the study reach.
River Continuity	No artificial impoundments or attenuating features are present in the surveyed reach (although there is an online reservoir approximately 2.5km downstream). There is a large tree in the channel which potentially causes continuity issues in peak flows. The watercourse flows through a steep valley and is therefore not connected to a floodplain.
River Depth and Width Variation	Channel width varies between 2m and 3m. Water depth is approximately 0.5m.
Structure and Substrate of the River Bed	Bed material composed primarily of sands and silt throughout surveyed reach.

Watercourse name	Northop Brook
Structure of the Riparian Zone	Channel flows through tilled farmland in surveyed reach. The riparian buffer zone is composed of scrub and shrubs with some mature trees and fallen trees.

LITTLE LEAD BROOK

Baseline data for Little Lead Brook

Watercourse name	Little Lead Brook
	Water feature type: Ordinary Watercourse Catchment area: $0.51km^2$ Key hydraulic connections: this watercourse flows northwards towards the Dee Estuary Surrounding land use: Rural (farmland, arable and pastoral land) River Condition Score: Moderate
Catchment Characteristics	A small catchment which is dominated by agriculture with no suburban areas. This is a steep catchment which slopes towards the Dee. There is a small on-line pond attenuating flow upstream of the study reach.
Catchment Geology and Soils	Bedrock is composed of the Pennine Lower Coal Measures Formation - Mudstone, Siltstone And Sandstone. Superficial geology is composed of Devensian aged till and diamicton.

Watercourse name	Little Lead Brook
Catchment Hydrology	There is an online pond in the catchment which attenuates flow. There are no gauges present in the catchment.
Historical Channel Change	Channel course unchanged since 1st edition OS maps, although online pond is relatively recent (post 1971).
Biological	
Fish	NRW advised that two SPIs, European eel and brown trout, are present in this watercourse. The reach within the DCO Proposed Development was however scoped out of further survey due to a lack of suitable fish habitat identified during the aquatic habitat walkover survey.
Invertebrates	Scoped out due to lack of suitable invertebrate habitat identified during the aquatic habitat walkover survey.
Macrophytes	Scoped out due to lack of suitable macrophyte and phytoplankton habitat identified during the aquatic habitat walkover survey.
Phytoplankton	
Physico-Chemical	
Thermal Conditions	When sampled on 16 June 2022, the water temperature was 13.8. No long-term monitoring data is available for this watercourse.

Watercourse name	Little Lead Brook
Oxygenation Conditions	When sampled on 16 June 2022, the dissolved oxygen level was recorded as 4.21mg/L (40.9% saturation). No long-term monitoring data is available for this watercourse.
Salinity	No data is available for this watercourse.
Acidification Status	When sampled on 116 June 2022, the pH was recorded as 7.68. No long-term monitoring data is available for this watercourse.
Nutrient Conditions	No data is available for this watercourse.
Priority Hazardous Substances	No data is available for this watercourse.
Hydromorphological	
Quantity and Dynamics of Flow	In the study reach flow is generally rippled with some areas of smooth flow.
River Continuity	There is an impoundment on the watercourse upstream of the study reach. There are no culverts through the study reach and there is no floodplain to be connected to the watercourse.
River Depth and Width Variation	Channel bankfull width is approximately 1m throughout the survey reach. Water depth is very shallow (0.05m).
Structure and Substrate of the River Bed	Channel bed composed of gravels and pebbles, with significant areas of sands and silts present.
Structure of the Riparian Zone	Extensive vegetation on both banks. There is ancient woodland on the right bank of the watercourse comprising mature trees and fallen

Watercourse name	Little Lead Brook
	trees. On the left bank there is tilled land behind occasional trees on the bank top.

Annex D

PROPOSED ACTIVITIES WITHIN EACH WATERCOURSE

ANNEX D: PROPOSED ACTIVITIES WITHIN EACH WATERCOURSE

Table D.1: Activities potentially impacting watercourses within each WFD water body along the DCO Proposed Development

Water Body Name and ID	Watercourse Name	Watercourse Type	Proposed Activities
Peckmill Brook, Hoolpool Gutter and Ince Marshes (GB112068060330)	**East Central Drain**	Main River	Installation of Ince AGI within 10m Drainage (Ince AGI)
	Elton Lane Ditch 1	Ditch	Installation of Ince AGI within 10m Culvert replacement and extension Open cut crossing
	Elton Lane Ditch 4	Ditch	Open cut crossing
	Elton Lane South Ditch	Ditch	Trenchless crossing
	Elton Marsh 1	Ditch	Trenchless crossing
	Elton Marsh 2	Ditch	Open cut crossing
	West Central Drain	Main River	Open cut crossing Dewatering
	Hapsford Brook	Main River	Open cut crossing
Mersey (GB531206908100)	**Elton Brook Tributary 1**	Ditch	Trenchless crossing
	Gale Brook	Main River	Open cut crossing
	Thornton Uplands	Main River	Open cut crossing
	Halls Green Lane Brook	Ditch	Open cut crossing
	Mersey	Transitional	Downstream receptor of watercourses with following activities proposed:

Water Body Name and ID	Watercourse Name	Watercourse Type	Proposed Activities
			Open cut crossing Dewatering Drainage
Gowy (Milton Brook to Mersey) (GB112068060 250)	**Thornton Main Drain**	Main River	Open cut crossing
	Gowy	Main River	Trenchless crossing, dewatering and downstream receptor of watercourses with following activities proposed: Open cut crossing Temporary watercourse crossings Dewatering
	Stanney Main Drain	Main River	Open cut crossing
Stanney Mill Brook (GB112068060 260)	**Stanney Mill Brook**	Main river	Open cut crossing
	Gowy Tributary 2	Ordinary Watercourse	Within Newbuild Infrastructure Boundary
	Wervin Hall Ditch Tributary	Ditch	Trenchless crossing
Shropshire Union Canal (GB71210133)	**Shropshire Union Canal**	Canal (Artificial)	Trenchless crossing
Manchester Ship Canal (GB71210004)	**Manchester Ship Canal**	Canal (Artificial)	Downstream receptor of watercourses with the following activities proposed: Open cut crossing Dewatering Drainage (Ince AGI) Culvert replacement and extension

Water Body Name and ID	Watercourse Name	Watercourse Type	Proposed Activities
Finchetts Gutter (GB111067056 930)	**Collinge Wood Brook**	Ditch	Open cut crossing
	Rake Lane Brook	Ordinary Watercourse	Open cut crossing
	Backford Brook	Main River	Open cut crossing
	Friars Park Ditch	Ordinary Watercourse	Open cut crossing Temporary watercourse crossing
	Gypsy Lane Brook	Ditch	Open cut crossing
	Overwood Ditch	Ditch	Drainage (Mollington BVS)
	Finchetts Gutter Tributary	Ordinary Watercourse	Open cut crossing
	Sealand Main Drain	Main River	Open cut crossing
Garden City Drain (GB111067056 960)	**Seahill Tributary 2**	Ordinary Watercourse	Open cut crossing
	Seahill Drain	Main River	Open cut crossing
Sandycroft Drain (GB111067052 160)	**Railway Ditches**	Ditch	Trenchless crossing
	Broughton Brook	Main River	Trenchless crossing
	Sandycroft Drain	Main River	Open cut crossing Trenchless crossing
	Mancot Brook	Ordinary Watercourse	3x open cut crossing
	Chester Road Drain North	Main River	Trenchless crossing
	Chester Road Drain Tributary 1	Main River	Trenchless crossing

Water Body Name and ID	Watercourse Name	Watercourse Type	Proposed Activities
Wepre Brook (GB111067056880)	**New Inn Brook**	Ordinary Watercourse	Open cut crossing
	Alltami Brook	Ordinary Watercourse	Open cut crossing
	Wepre Brook	Ordinary Watercourse	Open cut crossing Drainage (Northop Hall AGI)
Dee (N. Wales) (GB531106708200)	**Dee Estuary**	Transitional	Trenchless crossing and downstream receptor of watercourses with the following activities proposed: Temporary watercourse crossing Trenchless crossing Open cut crossing Drainage
	Hawarden Brook	Main River	Temporary watercourse crossing
	Willow Park Brook	Ordinary Watercourse	Open cut crossing
	Aston Hall Brook	Ordinary Watercourse	Within Newbuild Infrastructure Boundary
	Northop Brook	Ordinary Watercourse	Trenchless crossing
	Little Lead Brook	Ordinary Watercourse	Drainage (from Fflint AGI)
Swinchiard Brook (GB111067056940)	**Nant-y-Fflint**	Ordinary Watercourse	Drainage (from Cornist Lane BVS)

Annex E

DESIGN PRINCIPLES FOR WATERCOURSE REINSTATEMENT

ANNEX E - DESIGN PRINCIPLES FOR WATERCOURSE REINSTATEMENT

The reinstatement of Rivers and Stream Habitats for compliance with the WFD and BNG should recreate baseline conditions as far as practicable and potentially provide enhancements to deliver BNG Rivers commitments. The following design principles described below serve to assist in the reinstatement of rivers and streams post construction activities. These principles are based upon fluvial dynamic processes to help ensure sustainable reinstatement of functional habitat. These principles should be adopted as far as practicable:

PLANFORM:

For man-made channels that are straight by design (e.g., ditches and canals), the planform should be kept as much as practical to the original geometry. In the case of natural watercourses, the planform geometry should be kept to the regional wavelength as much as practical. Natural channel sinuosity ranges from 1 to 1.13, with 1.05 on average, indicating that for 1km of valley length produces on average 1.05km of river length throughout the Study Area. This sinuosity should be reinstated to any natural channel impacted by the Proposed Development as much as practical. The design wavelength (L_m) can be approximated Ferguson (1975) for UK rivers:

$L_m = 12.34W$, where W is reach channel width (**Figure E.1**).

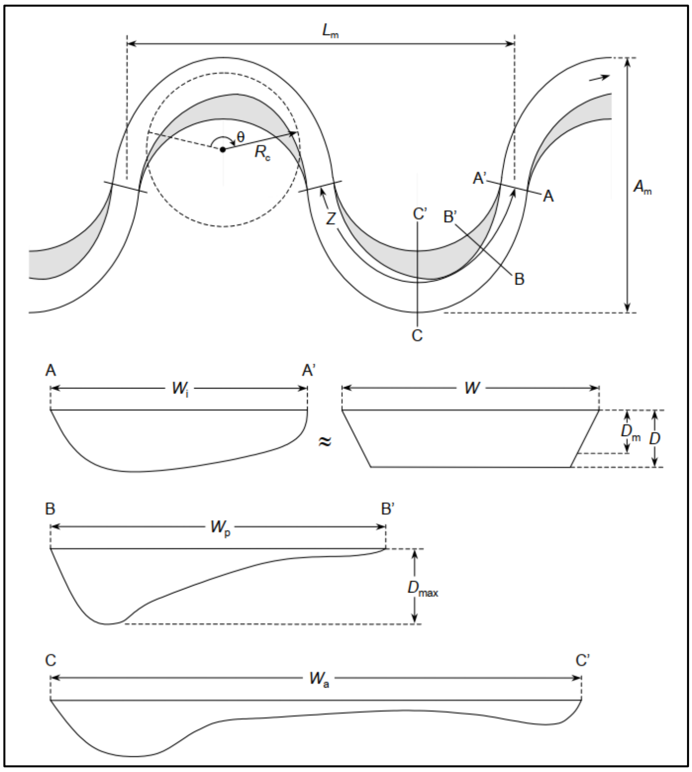


Figure E.1: Meander planform and cross section dimensions for restoration design. Note: point bars are defined by shaded regions; Lm = meander wavelength, Z = meander arc length (riffle spacing); Am = meander belt width, Rc = radius of curvature; θ = meander arc angle; W = reach average bankfull width; D = depth of trapezoidal cross section; Dm = mean depth (cross-sectional area / W); Dmax = maximum scour depth in bendway pool; Wi = width at meander inflexion point; Wp = width at maximum scour location; Wa = width at meander bend apex. Adapted from Soar and Thorne (2001).

RIFFLES AND RIFFLE SPACING:

For natural channels, riffle crests are to be ~ 0.25 m above bed elevation. If possible, please duplicate riffle crest section regularly at half the design wavelength ($L_m/2$) and drop the bed by 0.25 m (below bed elevation) to create pools. Ideally, riffles should be spaced ~ 5 to 7 channel widths. The riffle crests should be facing upstream, thus creating a gentle slope.

A more site-specific riffle design can also be achieved by the following rules (Hey and Thorne, 1986):

- Riffle width (R_w), $R_w = 1.034W$
- Mean riffle depth (R_d),$R_d = 0.951d$ where d is the mean reach channel depth.
- Maximum riffle depth (R_{dm}), $R_{dm} = 0.912d_m$ where dm is the maximum reach channel depth.

- Median riffle bed size material (R_{D50}), $R_{dm} = 1.19D_{50}$ where $D_{50}$is the reach channel median bed size material.

Figure E.1 provides an overview of riffle sections (cross-section A-A’).

POOLS AND POOL SPACING:

For natural channels, pools are to be ~ 0.25 m below reach bed elevation. If possible, please duplicate pool floor 2.25 m upstream and downstream and lower the bed by 0.25 m (above reach bed elevation) to create riffles. Ideally, pools should be spaced ~ 5 to 7 channel widths and/or coincide with riffles.

A more site-specific pool design can also be achieved by the following rules (Hey and Thorne, 1986):

- Pool width (P_w), $P_w = 0.966W$
- Mean pool depth (P_d),$P_d = 1.049d$, where d is the mean reach channel depth.
- Maximum pool depth (P_{dm}), $P_{dm} = 1.088dm$, where dm is the maximum reach channel depth.
- Median pool bed size material (P_{D50}), $P_{dm} = 0.81D_{50}$, where $D_{50}$is the reach channel median bed size material.

Figure E.1 provides an overview of pool sections (cross-section B-B’).

DEPOSITIONAL FEATURES:

Point bars are to extend outwards from the centre of the channel up to 0.25m at the bank edge. Similarly, duplicate the section 1.5m upstream and downstream so that point bar isn't interpolated too far. There's some freedom with their width. Ideally no less than 3m absolute minimum, but it can extend as far as 7m if needed. Keep them at least 0.3m above bed elevation and duplicate sections up to 4m upstream and downstream to avoid interpolating too far.

Figure E.1 provides an overview of meander bend apex section with an associated point bar (cross-section C-C’).

LARGE WOOD & LOG JAMS:

Engineered log jams and large wood structures can be used for a variety of restoration and enhancement goals. They are commonly built by stacking whole trees and logs in crisscross arrangements, and consist of:

- Woody material of appropriate size consisting of root wads, logs, tree trunks, and smaller woody debris.
- Live brush or bank vegetation may be incorporated.
- Backfill material.
- Sequence of works:

- Excavate bed and bank as needed for buried portions of the log jam.
- Place logs in interlocking or crisscross pattern according to design.
- Place backfill material, compacting as needed, to build finished bank and bed surface around the log jam.
- Re-use large wood present within the watercourse prior to the construction works as far as practicable. Such wood should be stored on site during construction and replaced to replicate the baseline conditions.

FLOW TYPE DIVERSITY:

Flow type diversity is a function of river channel morphology and discharge. As discharge is designed to be the same as the existing condition, it is important to replicate, and enhance, the same features from the existing channel, as much as practical. This includes the construction of riffles, pools, berms, point bars, large wood and log jams along the constructed channel in a similar frequency to the existing condition (or higher, if enhancement is expected).

BANK PROFILES:

Bank profiles should be kept to 1:3 slope as much as practical to avoid bank failure due to gravitational forces triggered by toe scour. Banks with slopes steeper than 1:2 should not be constructed.

BANK FACE AND RIPARIAN VEGETATION STRUCTURE:

Newly constructed bank faces and riparian habitats should be pre-seeded with appropriate species, then covered with biodegradable erosion protection blankets (e.g., coir matting). Biodegradable erosion control blankets are designed to provide immediate erosion protection and vegetation establishment assistance, then degrade after the root and stem systems of the vegetation are mature enough to permanently stabilise the underlying soil. The table and figure below detail the appliable UK plants, and the coir matting to the DCO Proposed Development.

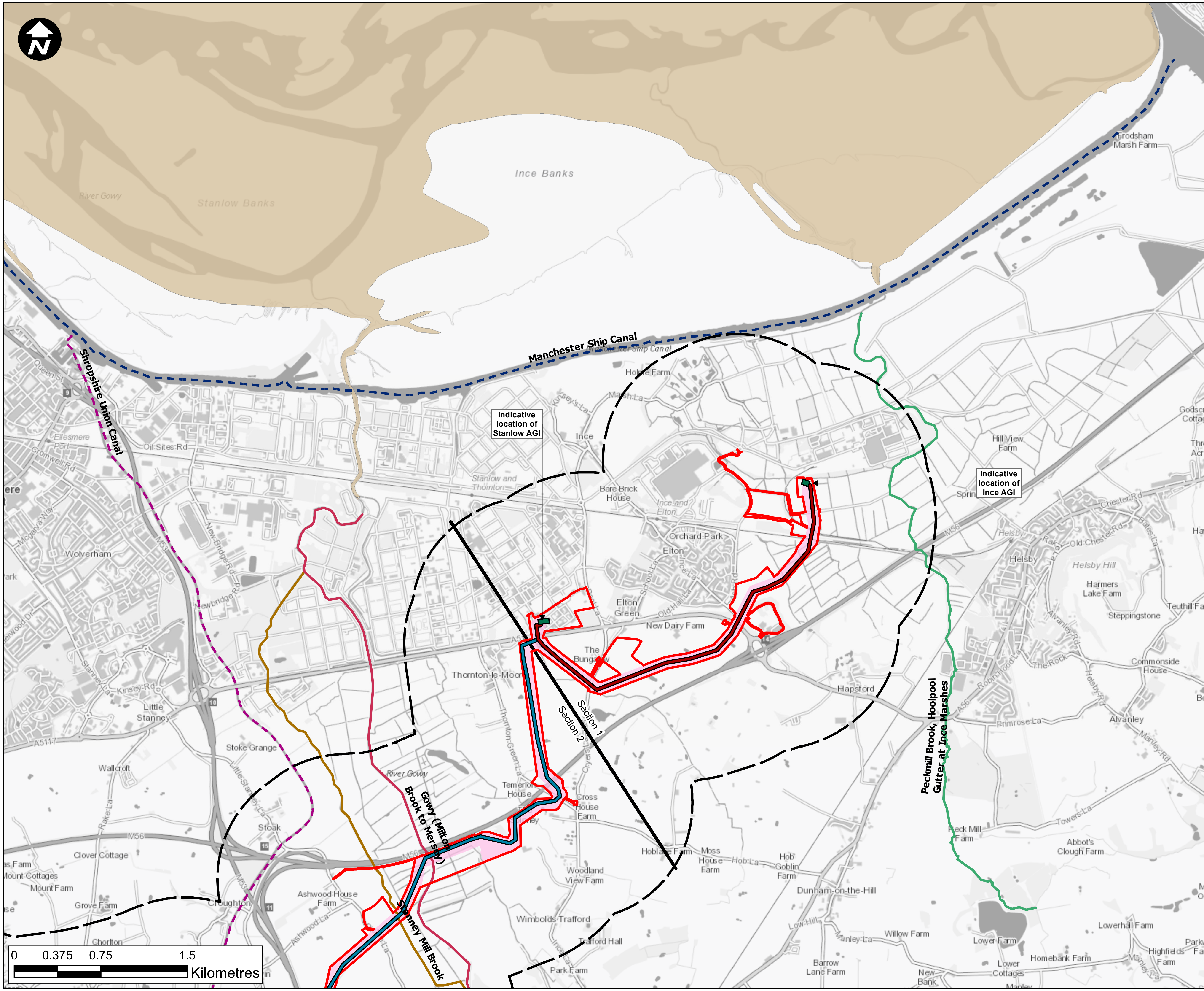
Table E.1: List of applicable UK plant lists. Available at Salix (https://www.salixrw.com/).

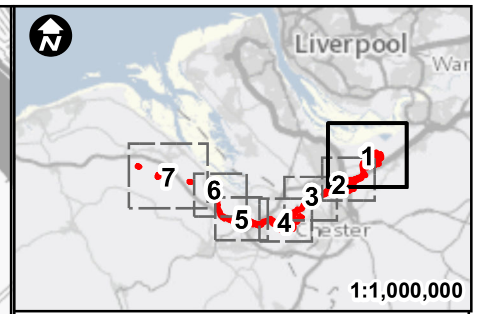
Latin name	Popular name
Wildflowers	
Achillia millefolium	Yarrow
Achillia ptarmica	Sneezewort
Agrimonia eupatoria	Agrimony
Agrostemma githago	Corn Cockle
Ajuga reptans	Bugle
Alchemilla Mollis	Ladys Mantle
Alliaria petiolata	Garlic Mustard
Marginals and Aquatics	
Acorus calamus	Sweet Flag
Alisma plantago-aquatica	Water Plantain
Angelica sylvestris	Wild Angelica
Apium nodiflorum	Fools Watercress
Berula erecta	Lesser Water Parsnip
Bolboschoenus (Scirpus) maritimus	Sea Club-Rush
Butomus umbellatus	Flowering Rush
Callitriche stagnalis	Starwort
Caltha palustris	Marsh Marigold
Carex acuta	Slender Tufted Sedge
Trees and Climbers	

Latin name	Popular name
Populus nigra ssp betulifolia	Black poplar
Hedera helix	English Ivy
Grasses and Sedges	
Agrostis capillaris	Common Bent
Agrostis stolonifera	Creeping Bent
Alopecurus pratensis	Meadow Foxtail
Anthoxanthum odoratum	Sweet Vernal Grass
Arrhenatherum elatius	False Oat Grass
Carex sylvatica	Wood Sedge

Annex F

WFDa FIGURES





Key:

- Section Dividing Line
- Newbuild Infrastructure Boundary
- 1km Buffer
- Permanent land take area
- Ince AGI to Stanlow AGI Pipeline
- Stanlow AGI to Flint AGI Pipeline
- Above Ground Installation (AGI)

WFD Waterbody

- Gowy (Milton Brook to Mersey)
- Manchester Ship Canal
- Peckmill Brook, Hoolpool Gutter at Ince Marshes
- Shropshire Union Canal
- Stanney Mill Brook
- Mersey Transitional

HyNet North West

PROJECT TITLE

HyNet Carbon Dioxide Pipeline

DRAWING TITLE

Figure 18.3.1 WFD waterbodies - Sheet 1 of 7

DRAWING STATUS

FOR INFORMATION

DRAWN	CHECKED	APPROVED	AUTHORISED
NC	PM	DF	DP

SCALE @ A3 SIZE	DATE	REVISION
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DRAWING NUMBER

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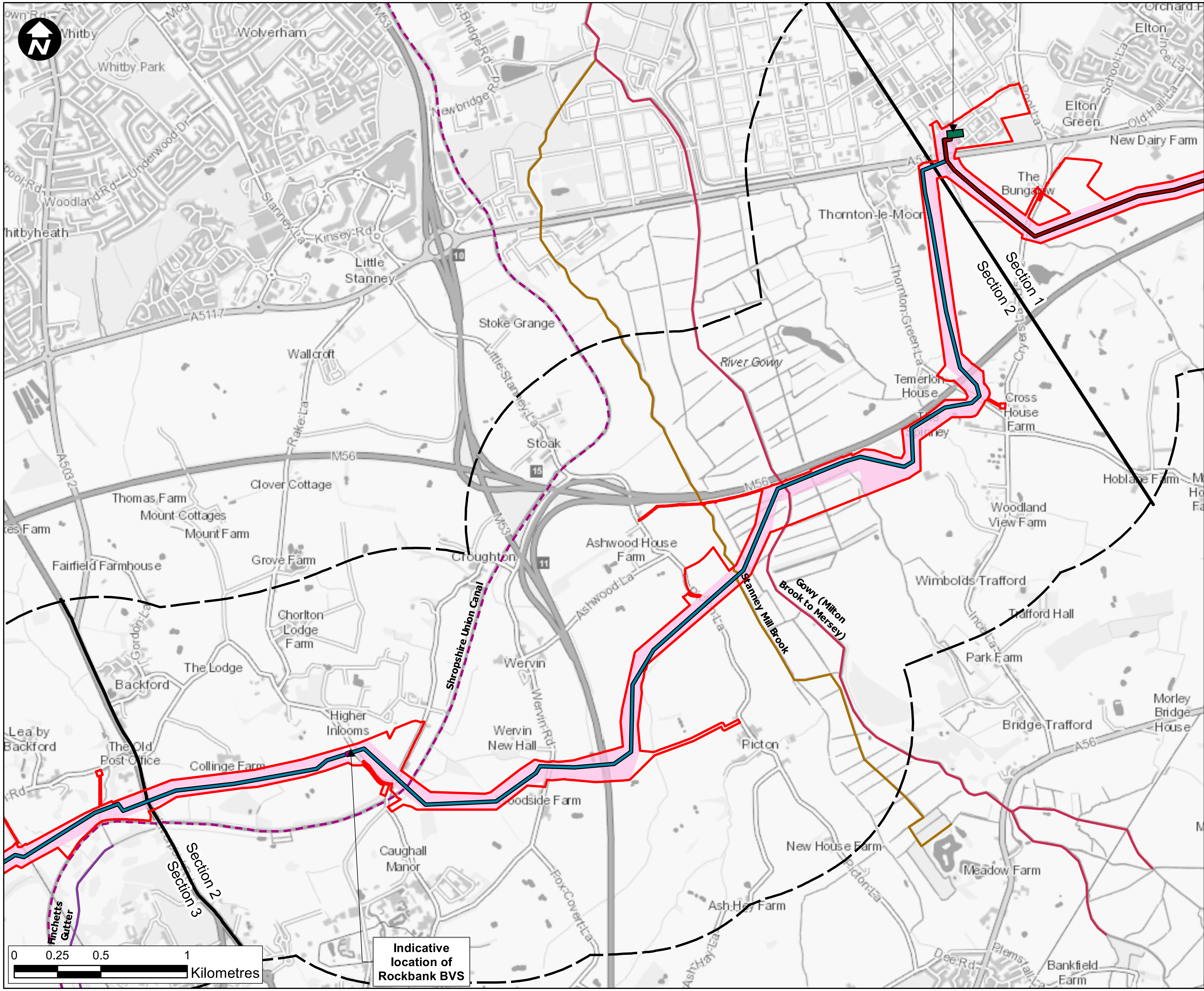

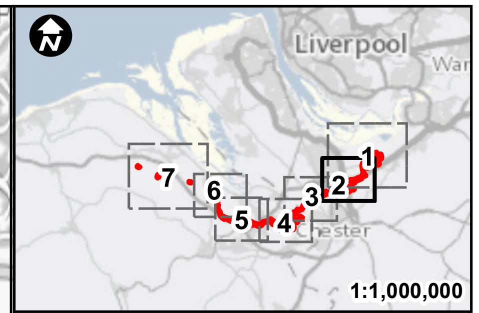

Key:

- Section Dividing Line
- Newbuild Infrastructure Boundary
- 1km Buffer
- Permanent land take area
- Ince AGI to Stanlow AGI Pipeline
- Stanlow AGI to Flint AGI Pipeline
- Above Ground Installation (AGI)
- Block Valve Station (BVS)

WFD Waterbody

- Finchetts Gutter
- Gowy (Milton Brook to Mersey)
- Shropshire Union Canal
- Stanney Mill Brook

HyNet North West

PROJECT TITLE
HyNet Carbon Dioxide Pipeline

DRAWING TITLE
Figure 18.3.1 WFD waterbodies - Sheet 2 of 7

DRAWING STATUS
FOR INFORMATION

DRAWN	CHECKED	APPROVED	AUTHORISED
NC	PM	DF	DP

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DRAWING NUMBER
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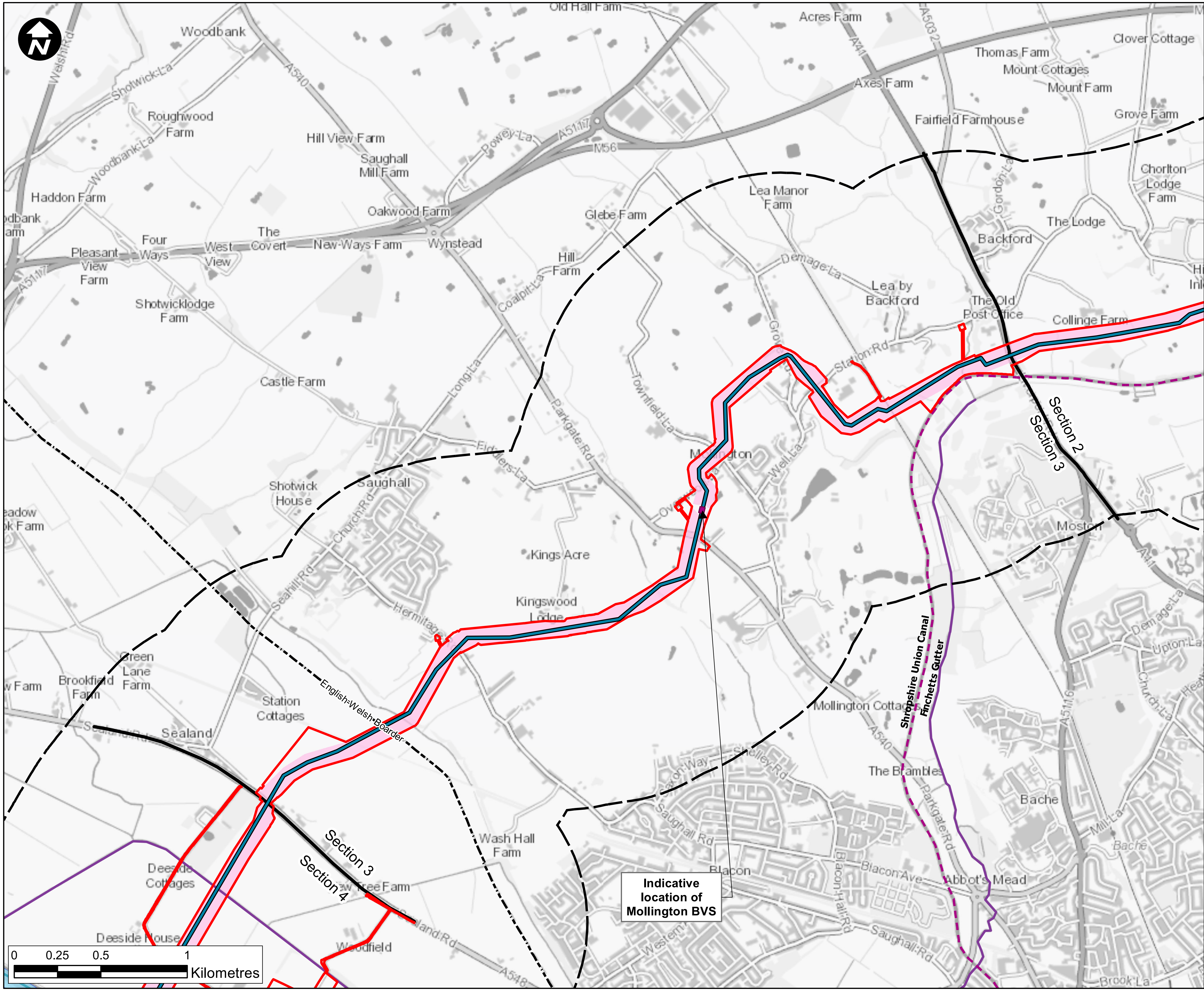

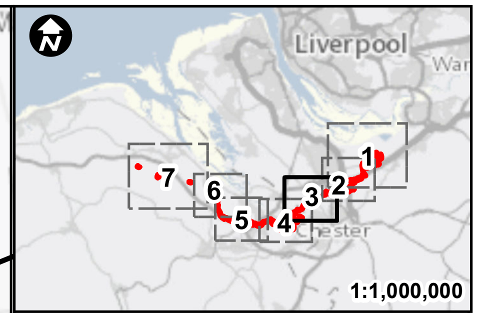

Key:

- Section Dividing Line
- Newbuild Infrastructure Boundary
- 1km Buffer
- Permanent land take area
- Stanlow AGI to Flint AGI Pipeline
- Block Valve Station (BVS)

WFD Waterbody

- Dee
- Finchetts Gutter
- Shropshire Union Canal
- Dee Transitional WFD waterbody

HyNet North West

PROJECT TITLE

HyNet Carbon Dioxide Pipeline

DRAWING TITLE

Figure 18.3.1 WFD waterbodies - Sheet 3 of 7

DRAWING STATUS

FOR INFORMATION

DRAWN	CHECKED	APPROVED	AUTHORISED
NC	PM	DF	DP

SCALE @ A3 SIZE	DATE	REVISION
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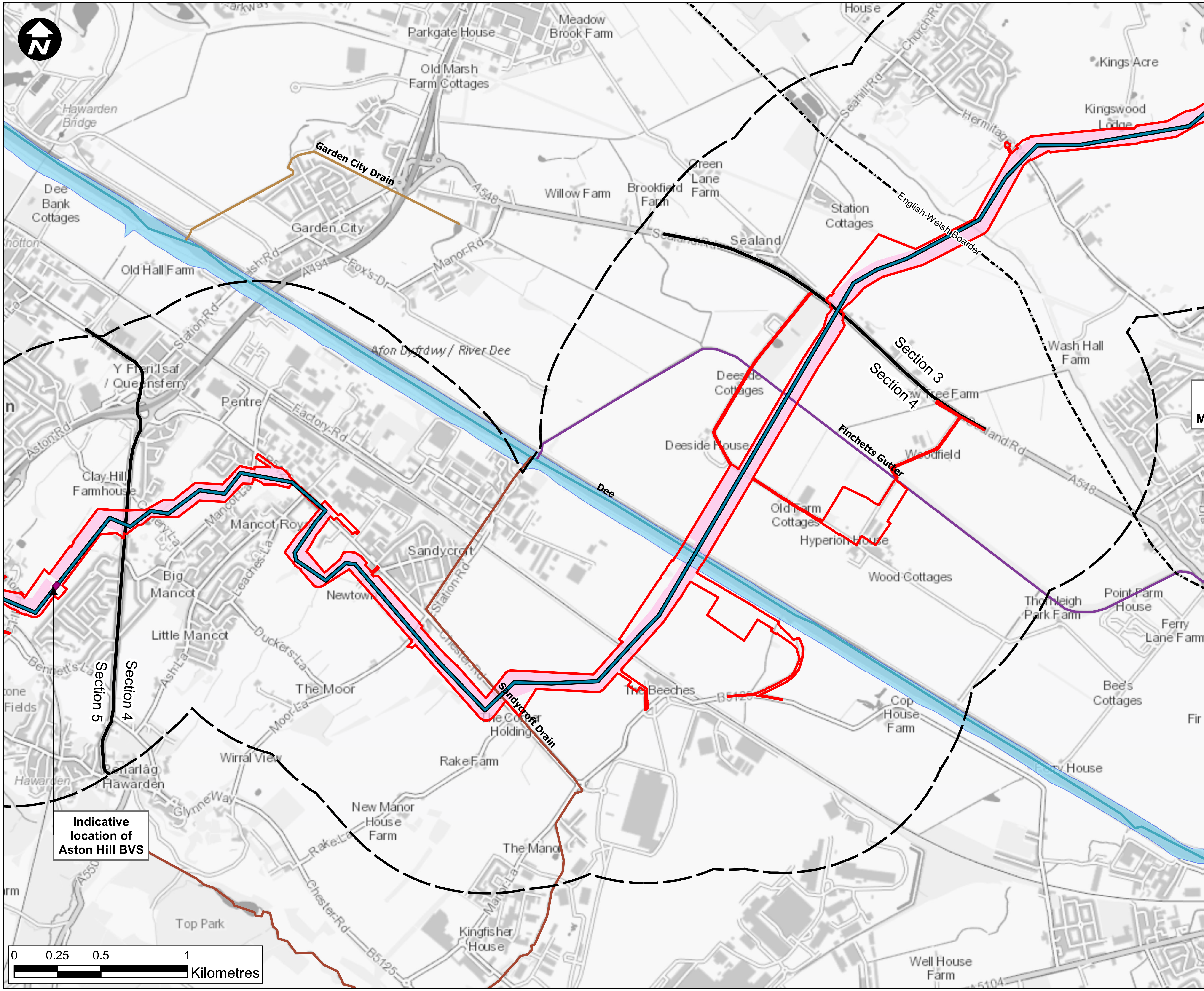
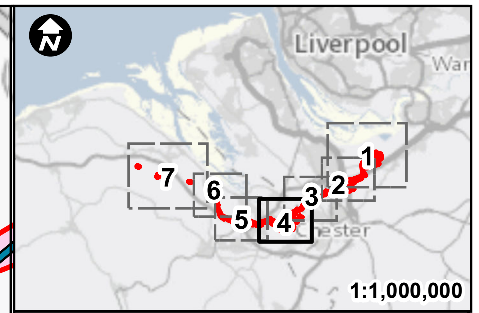




Key:

- Section Dividing Line
- Newbuild Infrastructure Boundary
- 1km Buffer
- Permanent land take area
- Stanlow AGI to Flint AGI Pipeline
- Block Valve Station (BVS)

WFD Waterbody

- Dee
- Finchetts Gutter
- Garden City Drain
- Sandycroft Drain
- Dee Transitional WFD waterbody

HyNet North West

PROJECT TITLE

HyNet Carbon Dioxide Pipeline

DRAWING TITLE

Figure 18.3.1 WFD waterbodies - Sheet 4 of 7

DRAWING STATUS

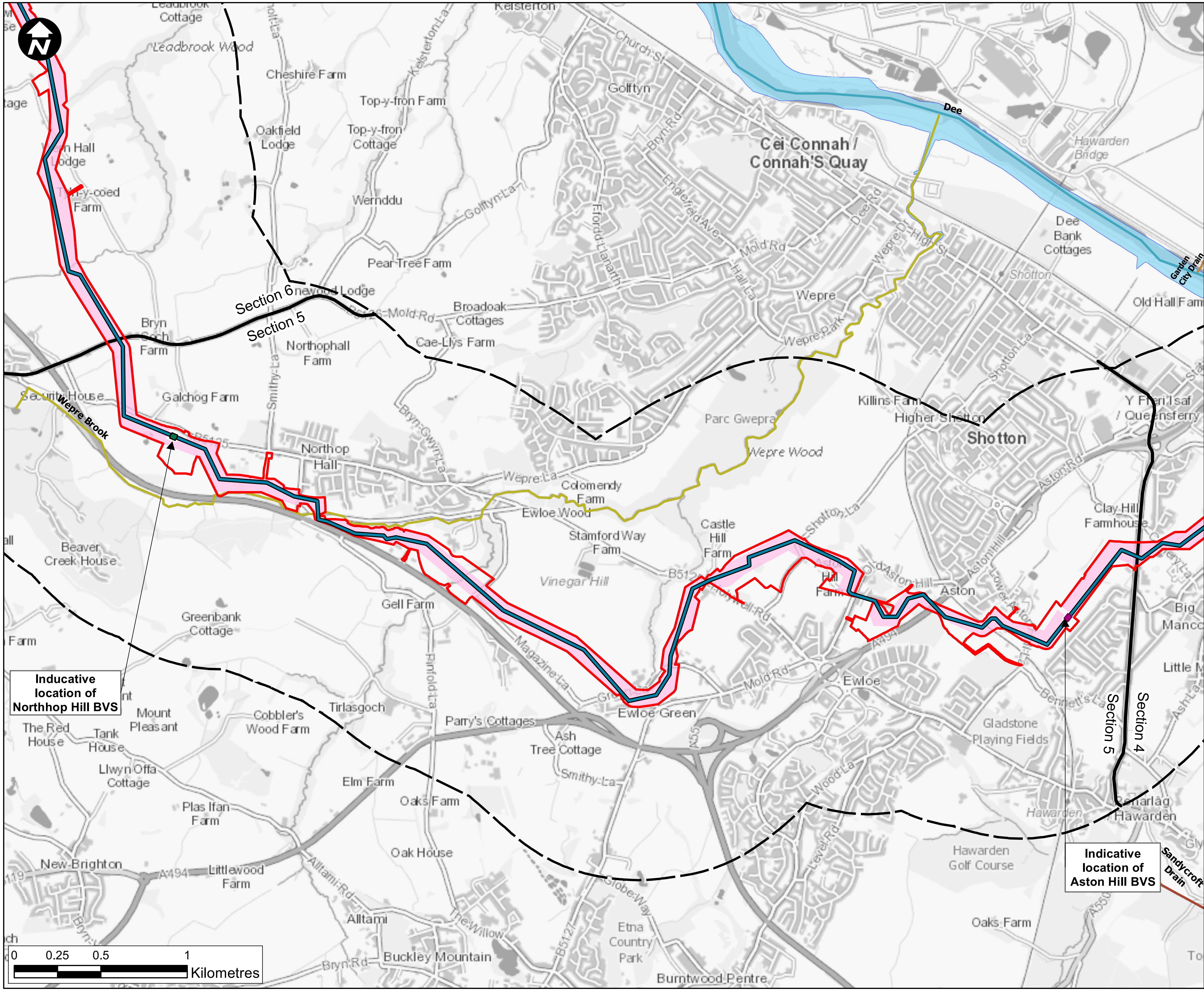
FOR INFORMATION

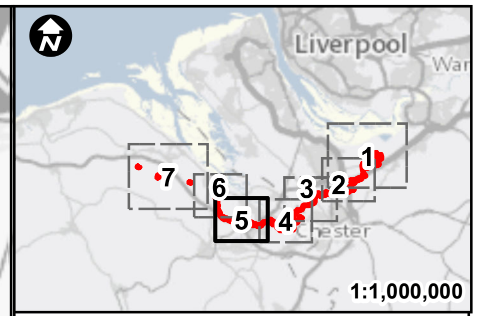
DRAWN	CHECKED	APPROVED	AUTHORISED
NC	PM	DF	DP

SCALE @ A3 SIZE	DATE	REVISION
1:20,000	29/07/2022	P00

DRAWING NUMBER

EN070007-PA-PEI-18.3.1-Sheet 4





Key:

- Section Dividing Line
- Newbuild Infrastructure Boundary
- 1km Buffer
- Permanent land take area
- Stanlow AGI to Flint AGI Pipeline
- Above Ground Installation (AGI)
- Block Valve Station (BVS)

WFD Waterbody

- Dee
- Garden City Drain
- Sandycroft Drain
- Wepre Brook
- Dee Transitional WFD waterbody

HyNet North West

PROJECT TITLE
HyNet Carbon Dioxide Pipeline

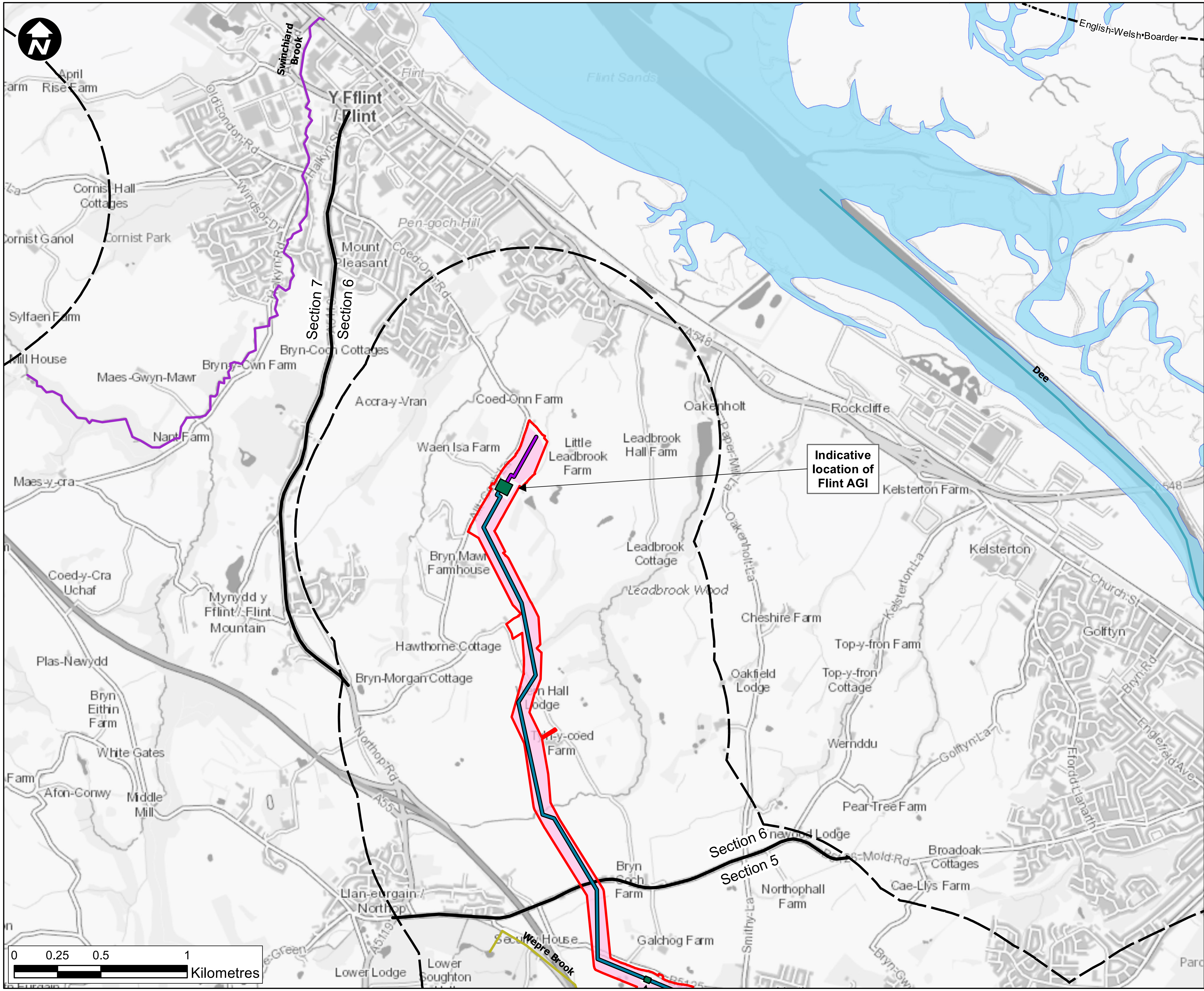
DRAWING TITLE
Figure 18.3.1 WFD waterbodies - Sheet 5 of 7

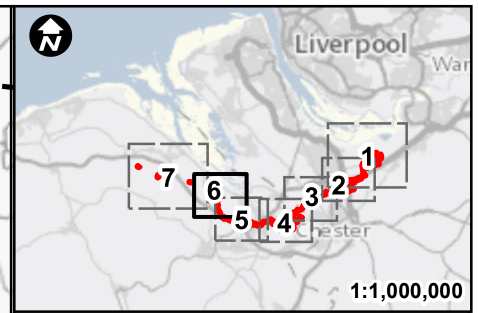
DRAWING STATUS
FOR INFORMATION

DRAWN	CHECKED	APPROVED	AUTHORISED
NC	PM	DF	DP

SCALE @ A3 SIZE	DATE	REVISION
1:20,000	29/07/2022	P00

DRAWING NUMBER
EN070007-PA-PEI-18.3.1-Sheet 5





Key:

- Section Dividing Line
- Newbuild Infrastructure Boundary
- 1km Buffer
- Permanent land take area
- Flint AGI to Flint Connection Pipeline
- Stanlow AGI to Flint AGI Pipeline
- Above Ground Installation (AGI)

WFD Waterbody

- Dee
- Swinchiard Brook
- Wepre Brook
- Dee Transitional WFD waterbody

HyNet North West

PROJECT TITLE

HyNet Carbon Dioxide Pipeline

DRAWING TITLE

Figure 18.3.1 WFD waterbodies - Sheet 6 of 7

DRAWING STATUS

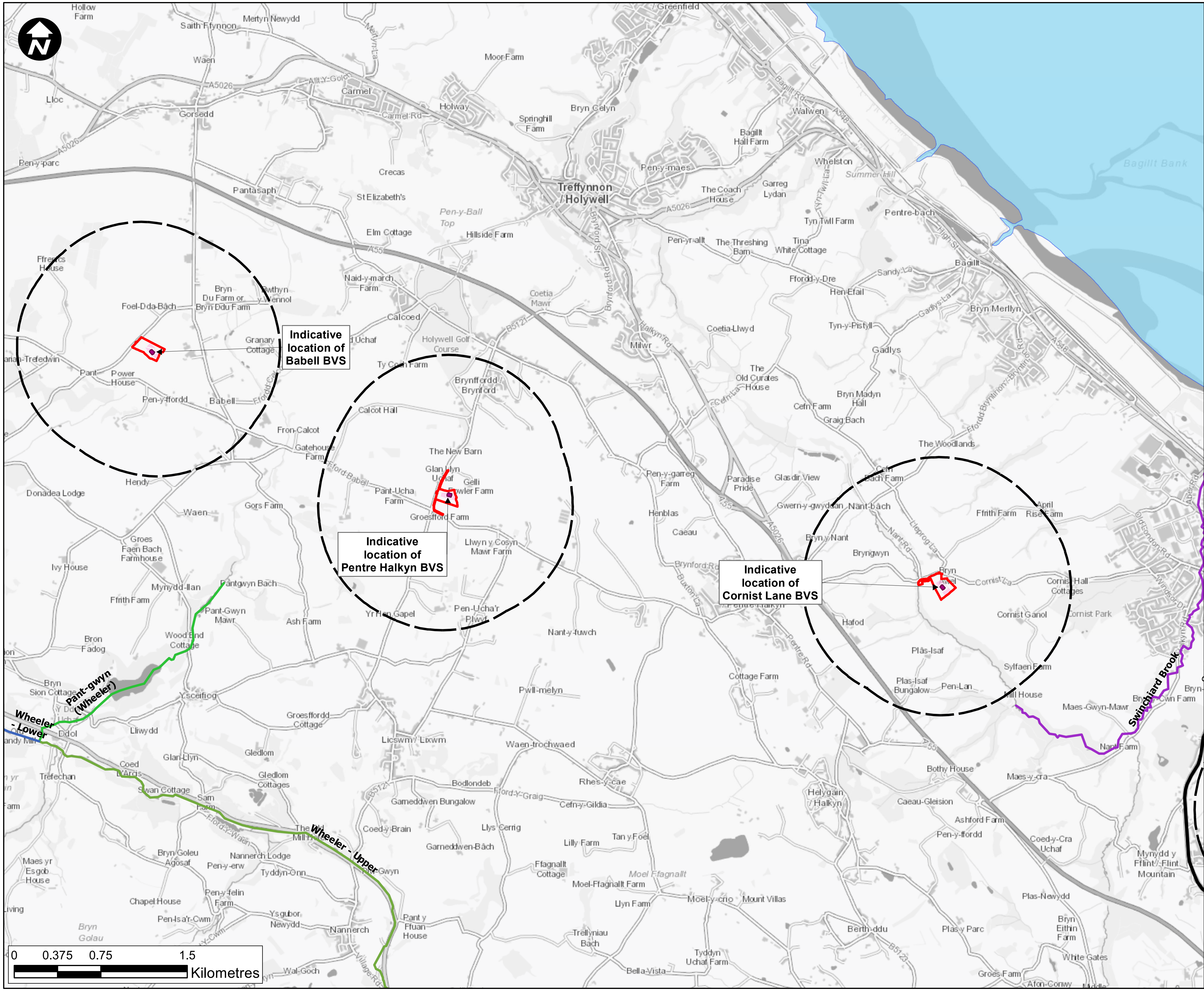
FOR INFORMATION

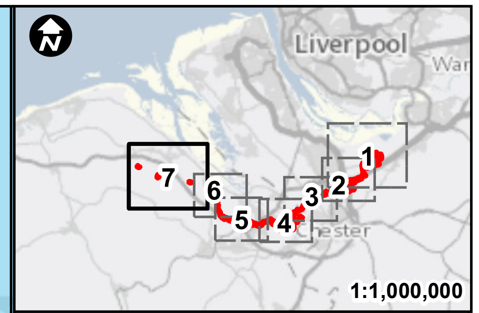
DRAWN	CHECKED	APPROVED	AUTHORISED
NC	PM	DF	DP

SCALE @ A3 SIZE	DATE	REVISION
1:20,000	29/07/2022	P00

DRAWING NUMBER

EN070007-PA-PEI-18.3.1-Sheet 6





Key:

- Section Dividing Line
- Newbuild Infrastructure Boundary
- 1km Buffer
- Permanent land take area
- Block Valve Station (BVS)

WFD Waterbody

- Pant-gwyn (Wheeler)
- Swinchiard Brook
- Wheeler - Lower
- Wheeler - Upper
- Dee Transitional WFD waterbody

HyNet North West

PROJECT TITLE	HyNet Carbon Dioxide Pipeline		
DRAWING TITLE	Figure 18.3.1 WFD waterbodies - Sheet 7 of 7		
DRAWING STATUS	FOR INFORMATION		
DRAWN: NC	CHECKED: PM	APPROVED: DF	AUTHORISED: DP
SCALE @ A3 SIZE: 1:30,000	DATE: 29/07/2022	REVISION: P00	
DRAWING NUMBER	EN070007-PA-PEI-18.3.1-Sheet 7		