HyNet North West

ENVIRONMENTAL IMPACT ASSESSMENT SCOPING REPORT

HyNet North West Carbon Dioxide Pipeline DCO

Planning Act 2008

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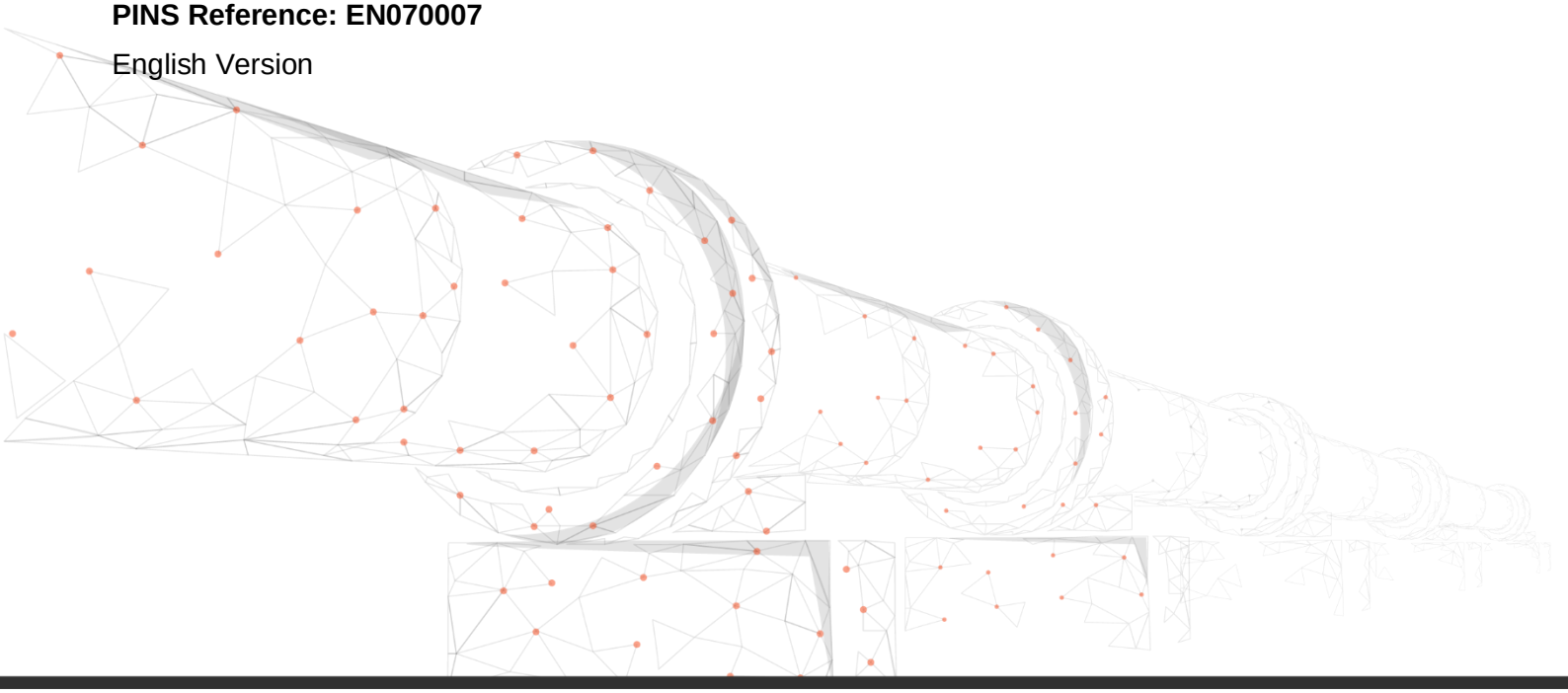

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GLOSSARY

Term	Definition
Above-Ground Heritage Asset	An above ground building, monument, site, place, area or Landscape identified as having a degree of significance meriting consideration in planning decisions, because of its **Heritage** interest. **Heritage Assets** include **Designated Heritage Assets** and **Non-Designated Heritage Assets**.
Above Ground Installation (AGI)	Equipment relating to the **carbon dioxide pipeline** which is necessary for its operation and/or maintenance and which is located in a secure compound above ground level.
Agricultural Land Classification (ALC)	A framework for determining the physical quality of the land at national, regional and local levels. This is based on the long-term physical limitations of land for agricultural use. There are a number of factors that affect the grade and the main ones are climate, site and soil characteristics, and the interactions between them.
Air Quality Management Area (AQMA)	Air Quality Management Areas (AQMAs) are areas that are likely to exceed the national air quality objective for a specific pollutant. They are determined by **Local Authorities.**
Ancient Woodland	Ancient Woodland is defined as an area that has been wooded continuously since at least 1600 AD. Ancient Woodland is divided into ancient semi-natural woodland and plantations on Ancient Woodland sites. Both types are classed as ancient woods.
Alcohols Site AGI	The **AGI** to be located within the **Stanlow Refinery site**. The AGI will be designed to accommodate **PIG** launcher and receiver facilities, **CO_2 Vent Facilities**, connections to emitters, and associated infrastructure.
Alcohols Site AGI to Flint AGI carbon dioxide pipeline	A section of new underground onshore pipeline (up to 36” in diameter) to transport CO_2 from the **Alcohols Site AGI** to the **Flint AGI**.
Applicant	The organisation (**Liverpool Bay CCS Limited**) responsible for the submission of the **DCO Application**.
Application	The Application for a **Development Consent Order** (DCO) that is submitted by the Applicant to the **Secretary of State (SoS)** for Business, Energy and Industrial Strategy (BEIS).

Term	Definition
Archaeological Interest	There will be archaeological interest in a **Heritage Asset** if it holds, or potentially may hold, evidence of past human activity worthy of expert investigation at some point. Heritage assets with archaeological interest are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them.
As Low As Reasonably Practicable (ALARP)	For a Risk to be ALARP, the cost, time or effort involved in reducing the **Risk** further would be grossly disproportionate to the benefit gained.
Authorised Development	The development that is described in Schedule 1 of the **draft Development Consent Order (dDCO).** This is also referred to as the **Proposed Development**.
Baseline	A reference level of existing **Environmental Conditions** against which a project is measured and controlled.
Baseline Studies	Work done to determine and describe the **Environmental Conditions** against which any future changes can be measured or predicted and assessed.
Below-Ground Heritage Asset	Below-ground heritage assets include both known and hitherto unknown buried archaeological remains.
Best and Most Versatile Agricultural Land (BMV)	Defined as Grades 1, 2 and 3a in the Agricultural Land Classification by the revised **National Planning Policy Framework (NPPF)** and **Planning Practice Guidance (PPG).** This is the land which is determined to be most flexible, productive and efficient in response to inputs and which can best deliver future crops for food and non-food uses such as biomass, fibres and pharmaceuticals. Grades 3b, 4, and 5 are used to classify land that is of moderate quality to very poor quality.
Best Available Techniques (BAT)	The available techniques which are the best for preventing or minimising **Emissions** and **Impacts** on the environment.
Biodiversity	The biological diversity of the earth's living resources. The total range of variability among systems and organisms at the following levels of organisation: bioregional, **Landscape**, ecosystem, **Habitats**, communities, **Species**, populations, individuals, genes and the structural and functional relationships within and between these different levels.

Term	Definition
Biodiversity Net Gain	Biodiversity Net Gain is an approach to development that leaves **biodiversity** in a better state than before.
Block Valve	An intermediate valve which can rapidly stem the flow of the carbon dioxide stream, designed and located to minimise the inventory loss to a level that avoids harm to humans in the event of a breach of the pipeline.
Block Valve Station (BVS)	An area containing a **Block Valve** and **Electrical and Instrumentation (E&I) Kiosk** and includes perimeter security fencing.
Book of Reference	A list of all of the land directly affected by the **Proposed Development**, as well as the owners and occupiers of the affected land and those with an interest in it.
Best Available Technique Reference Documents (BREF) Notes	The European Commission (EC) produces Best Available Technique reference documents or BREF notes. They contain **Best Available Techniques** (BAT) for installations.
Cadw	Cadw is the historic environment service of the Welsh Government which works to protect the historic buildings and structures, the landscapes and heritage sites of Wales.
Carbon Capture	The capture of CO_2 from industrial sources that would otherwise be emitted into the atmosphere.
Carbon Capture and Storage	The combined processes of **Carbon Capture**, transportation (by pipeline or otherwise), and **Carbon Dioxide Storage**
Carbon Dioxide Pipeline	The pipeline infrastructure to transport a CO_2 stream between the Grinsome Road AGI, Alcohols Site AGI and Flint AGI to the Point of Ayr AGI. This includes the **AGIs** themselves and the **Block Valves**.
Carbon Dioxide Pipeline Corridor	The final consented corridor within which the **Carbon Dioxide Pipeline** will be located.
Carbon Dioxide Pipeline Strategic Corridors	Four broad **Strategic Corridors** defined during the options selection phase. One of these was chosen within which to develop more detailed **Carbon Dioxide Pipeline Route** options.

Term	Definition
Carbon Dioxide Pipeline Route Options	Potential routes for the **Carbon Dioxide Pipeline**, identified during the options appraisal.
Carbon Dioxide Pipeline Route	The route of the constructed and operational **Carbon Dioxide Pipeline**.
Carbon Dioxide Storage	The locations for or act of providing the long-term sub-sea geological storage of carbon dioxide
Cathodic Protection	Cathodic protection (CP) is a technique used to control the corrosion of a metal surface by making it the cathode of an electrochemical cell.
Climate Change	Large scale, long term shift in the Earth's weather patterns or average temperature.
CO_2 Compressor	A unit used to compress the CO_2 to the desired pressure for transportation and storage purposes
CO_2 Stream	A fluid consisting overwhelmingly of carbon dioxide that has been captured from industrial sources, which also contains incidental associated substances derived from the source materials and the capture process (impurities), and any substances added to the stream to enable or improve the injection process.
CO_2 Vent Facility	A means whereby a CO_2 stream under pressure may be safely vented to atmosphere.
Combined effects	The interaction and combination of different residual (post-mitigation) environmental effects of the Proposed Development affecting the same **Receptor**. For example, visual and noise effects during construction affecting the same residential dwelling.
Competent Authority	The relevant **Secretary of State** is the Competent Authority for the purposes of the Habitats Directive and the Habitats Regulation in relation to applications for **Nationally Significant Infrastructure Projects** (NSIPs).
Compressor Plant	A compressor is a mechanical device that increases the pressure of a gas by reducing its volume. The existing gas treatment plant at Point of Ayr will be redeveloped for service, including onshore compressor plant, as part of the CO_2 transport and storage system.

Term	Definition
Connah's Quay Power Station	The existing power station located at Connah's Quay, which operates via Combined Cycle Gas Turbine technology and is currently connected to the **Connah's Quay to Point of Ayr pipeline**
Connah's Quay to Point of Ayr Pipeline	An existing 24" natural gas pipeline between Point of Ayr and Connah's Quay, of which the **Flint-PoA pipeline** section will be repurposed to transport a **CO_2 stream**.
Consortium	The delivery consortium for the Project. The Consortium partners include Cadent, CF Fertilisers, Eni, Essar, Progressive Energy, University of Chester, Hanson and Inovyn.
Construction Environmental Management Plan (CEMP)	Document containing the **REAC** setting out methods to avoid, minimise and mitigate Impact on the environment and surrounding area and the protocols to be followed in implementing these measures in accordance with environmental commitments during the **Construction Stage**.
Construction Stage	The stage during which construction works for the **Proposed Development** will take place.
Consultation Documents	The documents submitted to support the formal pre-application consultation under the **PA2008**. They included "plans and maps showing the nature and location of the proposed development" as stated in subsection (4) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.
Construction Compound	A secure area from which **Site** work is managed and resourced, including but not limited to temporary offices, workshops, parking and storage areas.
Consultation Zone	The **Health & Safety Executive** (HSE) sets a Consultation Distance around major hazard sites and major accident hazard pipelines after assessing the risks and likely effects of **major accidents** at the major hazard site/pipeline. The area enclosed within the CD is referred to as the consultation zone. The Local Planning Authority is notified of this CD and has a statutory duty to consult HSE on certain proposed developments within the zone the CD forms.
Contaminated Land	Where substances are causing or have a significant possibility to cause significant harm to people, property or protected species; or, where significant pollution is being caused or has a significant possibility of being caused to controlled waters.

Term	Definition
Cumulative Effects	The effects of the **Proposed Development** in cumulation with other existing development and/or approved development.
Decommissioning	The final process of shutting down the infrastructure comprised in the Proposed Development when it is no longer required once it has reached end of life.
Development Consent Order (DCO)	A Development Consent Order (DCO) is a Statutory Instrument (SI) made by the **Secretary of State** (SoS) pursuant to the Planning Act 2008 (as amended) (PA2008).
Development study area	The extent of works within the **Newbuild Infrastructure Scoping Boundary**, including areas required for temporary access, site compounds, working platforms and other enabling activities.
Direct Effect	An effect that is directly attributable to the **Proposed Development.**
Direct Employment	An increase in local employment arising from further economic activity (jobs, expenditure or income) associated with additional local income and local supplier purchases as a result of the **Proposed Development**.
Disaster	In the context of the **Proposed Development**, a naturally occurring phenomenon such as an extreme weather event (e.g. storm, flood, temperature) or ground-related hazard events (e.g. subsidence, landslide, earthquake) with the potential to cause an event or situation that meets the definition of a **Major Accident.**
Douglas Complex	A 54m high system of 3 interlinked offshore platforms located in Liverpool Bay oil and gas fields. Currently serves to facilitate the extraction of gas from the Liverpool Bay gas fields and will be redeveloped as part of **the Project**.
Douglas-PoA pipeline	The existing pipeline which runs from the **Douglas Complex** to the **Point of Ayr terminal**
EIA Directive	Directive 85/337/EEC (as amended). The initial Directive of 1985 and its three amendments have been codified by Directive 2011/92/EU of 13 December 2011. Directive 2011/92/EU has been amended in 2014 by Directive 2014/52/EU.
EIA Regulations	The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

Term	Definition
Electrical and Instrumentation (E&I) Kiosk	A cabinet type container housing electrical component necessary to monitor and operate the **Block Valves**.
Emission	A material that is expelled or released to the environment. Usually applied to gaseous or odorous discharges to the atmosphere.
Emission Rate	The quantity of a pollutant released from a source over a given period of time.
Enhancement	Measures to improve the environment, such as landscape resource and the **Visual Amenity** of the **Proposed Development** and its wider setting, over and above its **Baseline** condition.
Environmental Impact Assessment (EIA)	A systematic means of assessing the significance of effects from the **Proposed Development**, undertaken in accordance with The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (**EIA Regulations**).
EIA Regulations	Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
Environmental Statement (ES)	A statement prepared in accordance with the **EIA Regulations** that includes the information that is reasonably required to assess the likely effects of a development and which the applicant can, having regard in particular to current knowledge and methods of assessment, reasonably be required to compile.
European Designated Site	An area of land subject to protection through European legislation, including **Special Area of Conservation** (SAC) and **Special Protection Area** (SPA).
Examining Authority (ExA)	Planning Inspector(s) responsible for conducting the examination and recommending a decision on a **DCO** application to the **Secretary of State** (SoS).
Exceedance	A period of time where the concentrations of a pollutant is greater than the appropriate air quality standard.
Existing Pipeline Scoping Boundary	The **Existing Pipeline Scoping Boundary** extends from the **Flint AGI** to the Point of Ayr as far as **MLWS**. The **Existing Pipeline Scoping Boundary** is considered to be the maximum extent of land required to facilitate works associated with the **Existing Pipeline Works**.

Term	Definition
Existing Pipeline Works	The elements of the **Project** comprising works to the **Flint-PoA pipeline**, modifications to the **Point of Ayr terminal**, and new **Foreshore cables**, for which planning permission will be sought under separate **Town and Country Planning Act** Applications.
Expansive Study Area	The expansive study area extends to the availability of construction materials and the capacity of waste management facilities within the UK and the regions where the **Proposed Development** is located.
External Influencing Factor	A factor which occurs beyond the limits of the **Proposed Development** that may present a risk to the Proposed Development, e.g. if an external disaster occurred (e.g. earthquake, COMAH site major accident) it would increase the risk of serious damage to an environmental receptor associated with the Proposed Development.
Feed Gas	Gas to supply the **Hydrogen Plant**, which comprises a mixture of natural gas, synthetic natural gas, and refinery off gas.
Flint AGI	The AGI will be located south of Flint and will act as the tie-in point to the **Flint-PoA Pipeline**, which is being repurposed as part of the **Existing Pipeline Works**. The AGI will be designed to accommodate **PIG** launcher and receiver facilities, **CO_2 Vent Facilities**, and associated infrastructure.
Flint-PoA Pipeline	The section of the existing **Connah's Quay to Point of Ayr Pipeline** which spans from Flint AGI to Point of Ayr AGI.
Flood Consequence Assessment (FCA)	An assessment of the consequences of flooding.
Flood Map for Planning	Defines **Flood Zones** based on annual probability of flooding from Fluvial and tidal sources to inform development planning and flood risk assessment. Nationally consistent delineation of 'high', 'medium' and 'low' flood risk updated by the Environment Agency as deemed appropriate, typically on a quarterly basis.
Flood Risk Assessment (FRA)	An assessment of the risk of flooding.

Term	Definition
Flood Zones	Zones based on the annual probability of flooding from Fluvial and tidal sources, as defined in the **Flood Map for Planning**. Areas are categorised into one of the following: **Flood Zone 1, Flood Zone 2, Flood Zone 3a** or **Flood Zone 3b.**
Flood Zone 1	This zone comprises land assessed as having less than a 1 in 1,000 (0.1%) annual probability of flooding from rivers or the sea in any year.
Flood Zone 2	This zone comprises land assessed as having between a 1 in 100 (1%) and 1 in 1000 (0.1%) annual probability of flooding from rivers, or between a 1 in 200 (0.5%) and 1 in 1,000 (0.1%) annual probability of flooding from the sea in any year.
Flood Zone 3a	This zone comprises land assessed as having a 1 in 100 (1%) or greater annual probability of flooding from rivers or a 1 in 200 (0.5%) or greater annual probability of flooding from the sea in any year.
Flood Zone 3b	This zone comprises land where water has to flow or be stored in times of flood.
Fluvial	Processes associated with rivers and streams and the deposits and landforms created by them.
Foreshore cables	Proposed new electricity and fibre optic cables to be laid from the **Point of Ayr terminal** to the Douglas Complex (of which, construction up to the **Mean High-Water Mark** would be delivered as part of the **Proposed Development**)
Foreshore Pipeline	The section of the **Douglas – PoA pipeline** which is between the **Mean High-Water Spring** point to the **Point of Ayr terminal**
Future Baseline	The likely evolution of the baseline without implementation of the **Proposed Development**.
Geographical Information System (GIS)	A system that captures, stores, analyses, manages and presents data linked to location. It links spatial information to a digital database.
Geophysical Survey	Making and interpreting measurements of physical properties of the earth to determine subsurface conditions.
Geotechnical Survey	An investigation to determine the nature and engineering properties of the soil and other materials and to determine soil profiles and property assignments for the purpose of design and construction.

Term	Definition
Greenhouse Gas (GHG)	Gases that absorb and emit reflected solar radiation which result in the warming of the Earth's atmosphere. It is absorbed and emitted at specific wavelengths within the spectrum of infrared radiation emitted by the earth's surface, the atmosphere, and clouds. The six main GHGs whose emissions are human caused are: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbon and sulphur hexafluoride. In combination, these GHG emissions are commonly expressed in terms of 'carbon dioxide equivalents' (CO_2e) according to their relative global warming potential. For this reason, the shorthand 'carbon' may be used to refer to GHGs.
Grinsome Road AGI	The **AGI** to be located adjacent to the existing CF Fertiliser Plant. The AGI will be designed to accommodate **PIG** launcher facilities, **CO_2 Vent Facilities**, connections to future pipelines, and associated infrastructure.
Grinsome Road Above Ground Installation (AGI) to Alcohols Site AGI carbon dioxide pipeline	A section of new onshore underground pipeline (up to 20" in diameter) to transport CO_2 from the **Grinsome Road AGI** to the **Alcohols Site AGI**.
Ground Investigations	The physical investigation stage of the **Geotechnical Survey** of which **Geophysical Surveys** may be one element. Comprised of targeted investigations including both intrusive and non-intrusive techniques to prove ground conditions, determine soil / rock parameters and identify hazards associated with the ground conditions to inform a proposed development.
Groundwater	Groundwater is the store of water present beneath Earth's surface in rock and soil pore spaces and in the fractures of rock formations.
Groundwater Source Protection Zone (SPZ)	Also, **Source Protection Zone** (SPZ), defined for 2,000 groundwater sources such as wells, boreholes and springs used for public drinking water supply, show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. The SPZ maps show three main zones (inner, outer and total catchment) and a fourth zone of special interest, which the Environment Agency occasionally apply to a groundwater source.
Habitat	The environment in which populations or individual species live or grow.

Term	Definition
Habitats Directive	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna.
Habitats Regulations	The Conservation of Habitats and Species Regulations 2017 (as amended) which covers the terrestrial environment.
Habitats Regulations Assessment (HRA)	A **Habitats Regulations Assessment** (HRA) refers to the stages of assessment carried out by the competent authority in accordance with **Habitats Regulations** and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) to determine if a project may affect the protected features of a European site and European offshore marine site, before deciding whether to undertake, permit or authorise it.
Haul road	Haul roads are temporary roads provided within a contractor's site area to allow for the movement of construction materials, construction machinery and/or construction labour around the site.
Hazard	Anything with the potential to cause harm, including ill-health and injury, damage to property or the environment; or a combination of these.
Heritage	The historic environment and especially valued assets and qualities such as historic buildings and cultural traditions.
Heritage Asset	A building, monument, site, place, area or Landscape identified as having a degree of significance meriting consideration in planning decisions, because of its **Heritage** interest. Heritage Assets include **Designated Heritage Assets** and **Non-Designated Heritage Assets**.
Horizontal Directional Drilling (HDD)	Horizontal directional drilling (HDD) is a **Trenchless** construction method used to install pipes underground without disturbing the ground surface above. The drill is launched from one **HDD Compound** and retrieved from the HDD compound at the other end, and except for the launch and retrieving spaces above ground, the entire process takes place underground.
HDD Compound	Temporary compound within which the **Horizontal Directional Drilling** (HDD) operations takes place.
Hydrogen Pipeline	The pipeline, along with the associated hydrogen distribution infrastructure, will transport hydrogen from the production site at the **Hydrogen Plant** to points of use.

Term	Definition
Hydrogen Pipeline Corridor	The final consented corridor within which the **Hydrogen Pipeline** will be located.
Hydrogen Pipeline Route	The route of the constructed and operational **Hydrogen Pipeline**.
Hydrogen Production Plant	The facility at the **Stanlow Oil Refinery** site which will produce hydrogen for the **Project**. The purpose of the **Hydrogen Production Plant** is to manufacture **low carbon hydrogen** from **Feed Gas** and will incorporate **Carbon Capture.** The hydrogen is exported into the **Hydrogen Pipeline**.
Hydrogen Storage	Sub-terranean facility connected to the **Hydrogen Pipeline**, whereby hydrogen can be stored and subsequently accessed when demand requires it.
Hydrogen Supply Project	Plants producing **Low Carbon Hydrogen** will be developed initially on the **Stanlow Oil Refinery** site and then subsequently across the region. The Hydrogen Supply Project is developing **Hydrogen Production Plant** on which the **Project** will be based. Additional plants are envisaged by 2030 to provide 30TWh/yr of **Low Carbon Hydrogen** supply for the region.
Hydrology	The movement, distribution and quality of water throughout the earth.
Hydromorphology	The physical characteristics of the shape, boundaries and content of a water body.
HyNet North West (The Project)	The **Hydrogen Supply Project** is being developed by **the Consortium**. The goal of the HyNet project is to reduce carbon dioxide emissions from industry, homes and transport and support economic growth in the North West of England and North Wales. This includes the **Hydrogen Production Plant, Hydrogen Pipeline** and associated **AGIs**, **Hydrogen Storage, Carbon Dioxide Pipeline** and associated **AGIs**, **Carbon Capture**, **Carbon Dioxide Storage** and the **Existing Pipeline Works**.
Impact	A physical or measurable change to the environment attributable to the **Proposed Development**.
Index of Multiple Deprivation	The indices of deprivation measure relative deprivation in local authorities across England. The index of multiple deprivation is the most widely used of these indices.

Term	Definition
Indirect Effect	An effect that results indirectly from the **Proposed Development,** as a consequence of a '**Direct Effect'**, often occurring away from the **Site**, or as a result of a sequence of interrelationships or a complex pathway. They may be separated by distance or in time from the **Source** of the **effect**.
Indirect Employment	Employment growth arising locally through manufacturing services and suppliers to the construction process (indirect or supply linkage multipliers) as a result of the **Proposed Development**.
Induced Employment	Employment associated with local expenditure as a result of those who derive incomes from the direct and supply linkage impacts of the **Proposed Development**.
Internal Drainage Board	Each internal drainage board is a public body that manage water levels in an area, known as an internal drainage district, where there is a special need for drainage. They undertake works to reduce flood risk to people and property and manage water levels for agricultural and environmental needs within their district.
Internal Influencing Factor	A factor which occurs within the limits of the **Proposed Development** that may present a risk to the Proposed Development.
LAeq	Equivalent Continuous Level. When a noise varies over time, the LAeq is the equivalent continuous sound which would contain the same sound energy as the time varying sound.
Land Cover	The surface cover of the land usually expressed in terms of vegetation cover or lack of it. Related to, but not the same as, **Land Use**.
Land Use	What land is used for, based on broad categories of functional land cover, such as urban and infrastructure use and the different types of agricultural and forestry.
Landform	The shape and form of the land surface which has resulted from combinations of geology, geomorphology, slope, elevation and physical processes.
Landscape	An area, as perceived by people, the character of which is a result of the action and interaction of natural and/or human factors.

Term	Definition
Landscape and Visual Impact Assessment (LVIA)	A tool used to identify and assess the likely significant effect of change resulting from development both on the **Landscape** as an environmental resource in its own right and on people's views and **Visual Amenity**.
Landscape Character	A distinct, recognisable and consistent pattern of **Elements** in the **Landscape** that makes one Landscape different from another.
LAmax	LAmax is the maximum A - weighted sound pressure level recorded over the period stated. LAmax is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall **LAeq**,T noise level but will still affect the noise environment.
Lead Local Flood Authority (LLFA)	Local authority responsible to taking the lead on local flood risk management as defined within the Flood and Water Management Act 2010.
Likely Significant Effect	The significance of an environmental effect is typically a function of the 'value' or 'sensitivity' of the **receptor** and the 'magnitude' or 'scale' of the **impact**. Combining the environmental value of the resource or receptor with the magnitude of change produces a significance of effect category. The definition of a significant effect for each environmental topic will be contained within their respective chapters of the **Environmental Statement**.
Limit of Deviation	These limits show the maximum area within which the **Proposed Development** could be installed. This flexibility is required in order to deal with unforeseen circumstances, such as ground conditions and local features.
Limit of Land to Be Acquired Or Used	The limits of land to be acquired or used, as shown on the **Land Plans**.
Liverpool Bay CCS Limited	The organisation responsible for the application (**The Applicant**)
Local Development Plan (LDP)	The set of documents and plans that sets out the **local authority's** policies and proposals for the development and use of land in their area.

Term	Definition
Local Nature Reserve (LNR)	A site of importance for wildlife, geology, education or public enjoyment. Some are also nationally important **Site of Special Scientific Interest (SSSI).** Local Nature Reserves must be controlled by the **local authority** through ownership, lease or agreement with the owner.
Local Planning Authority (LPA)	The **local authority** or council that is empowered by law to exercise statutory town planning functions for a particular area of the UK.
Low Carbon Hydrogen	Hydrogen which has been produced with minimal atmospheric emissions of carbon dioxide.
Lower Layer Super Output Area (LSOA)	A geographic area with an average population of 1500 residents, identified for the purpose of reporting census data by the Office for National Statistics (ONS).
Lowest Observed Adverse Effect Level (LOAEL)	The level above which adverse effects on health and quality of life can be detected as a result of noise or vibration.
Main River	A watercourse shown as such on the **Flood Map for Planning** and can include any structure or appliance for controlling or regulating the flow of water in, into or out of a main river. Main Rivers are usually larger streams and rivers, but also include smaller watercourses of strategic drainage importance. Main Rivers are under the jurisdiction of the Environment Agency who have powers to carry out flood defence works to Main Rivers.
Major Accident	In the context of the **Proposed Development**, an event that threatens immediate or delayed serious damage to human health, welfare and/or the environment and requires the use of resources beyond those of the **Applicant** or its contractors to respond to the event. Serious damage includes the loss of life or permanent injury and/or permanent or long-lasting damage to an environmental receptor that cannot be restored through minor clean-up and restoration efforts. The significance of this effect will take into account the extent, severity and duration of harm and the sensitivity of the receptor.
Magnitude	A combination of the scale, extent and duration of an effect.
Mercaptan	The odorant added to natural gas in the gas distribution network.
Mean Low Water Springs	The average height of lower low water at spring tides at a location

Term	Definition
Mitigation Measures	Actions proposed to prevent, reduce and where possible, offset significant adverse effects arising from the whole or specific elements of the **Proposed Development.**
National Nature Reserve (NNR)	Established to protect sensitive features and to provide 'outdoor laboratories' for research.
National Planning Policy Framework (NPPF)	The document that sets out Government's planning policies for England and how these are expected to be applied. The NPPF was last revised in February 2019.
National Policy Statement (NPS)	Overarching policy designated under the Planning Act 2008 (as amended) (PA2008) concerning the planning and consenting of **Nationally Significant Infrastructure Projects** (NSIPs) in the UK.
Nationally Significant Infrastructure Project (NSIP)	Projects which fall under one of the categories in Part 3 of the Planning Act 2008 (as amended) (PA2008).
Nationally Designated Site	Areas of land subject to project through UK legislation, including Sites of **Special Scientific Interest** (SSSI) and **National Nature Reserves** (NNR)
Newbuild Infrastructure Scoping Boundary	The Newbuild Infrastructure Scoping Boundary extends from the proposed **Grinsome Road AGI** to the proposed **Flint AGI**. The Newbuild Infrastructure Scoping Boundary is based on an approximate 100m-wide corridor and is considered to be the maximum extent of all potential permanent and temporary construction works required as part of the **Proposed Development**.
Noise Action Plan Priority Area (NAPPA)	Areas where people's homes are exposed to a day-evening-night noise level exceeding 73 dB, or where people live alongside concrete trunk roads. These areas are identified as priority areas for intervention in the Noise Action Plan produced by the Welsh Government.
Noise Important Area (NIA)	Noise 'hotspots' as defined by the Noise Action Plan produced by DEFRA. Important Areas are defined as the areas where the 1% of the population that are affected by the highest noise levels are located according to the results of the strategic noise mapping undertaken by DEFRA.

Term	Definition
Noise Sensitive Receptor	Any identified **Receptor** likely to be affected by noise. These are generally human Receptors, and may include residential dwellings, work places, schools, hospitals, community facilities, places of worship, recreational spaces and ecological Receptors.
Nomis	Nomis is a service hosted by the Office for National Statistics (**ONS**) which provides access to the most detailed and up-to-date UK labour market statistics from official sources.
No Observed Effect Level (NOEL)	The level below which no effect from noise or vibration can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
Non-Statutory Consultation	Consultation with stakeholders on the **Proposed Development** which occurs in addition to the **Statutory Consultation** required under the **EIA Regulations**.
Non-Statutory Consultees	Consultees who – whilst not designated in law – are likely to have an interest in a proposed development and will therefore be consulted on the **Proposed Development**.
Open Cut	Open Cut is a method of installing a length of pipeline by clearing the ground along the **Carbon Dioxide Pipeline Route**, excavating a trench and installing a length of pipe. Following satisfactory testing of the pipe, the trench is backfilled, and the ground returned to its previous condition.
Operational Stage	The stage after which the **Proposed Development** is handed over by the relevant construction contractors and approved for operation. It will remain in its **Operational Stage** until operations cease.
Order Limits	The outer limits for the project, including the route and any temporary working areas that would be required to install the pipeline, such as access routes, and working compounds. The limits will be shown on the **Works Plans**.
Ordinary Watercourse	Any river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows that does not form part of a **Main River**. The **Lead Local Flood Authority** (LLFA) or **Internal Drainage Board** (IDB) where relevant, has powers for Ordinary Watercourses that are similar to those held by the Environment Agency for **Main Rivers**.

Term	Definition
Parameters	A limit or boundary which defines the scope of a particular process or activity.
Phase 1 Habitat Survey	An ecological survey technique that provides a standardised system to record vegetation and wildlife **Habitat**. It enables a basic assessment of **Habitat** type and its potential importance for nature conservation.
Pipeline Inspection Gauge (PIG)	A device used for inspecting internal maintenance, cleaning and monitoring of a pipeline.
Pigging	Use of a **PIG**.
Pipeline Construction Activities	Construction Activities specific to the **Carbon Dioxide Pipeline**, to include methods such as **Open Cut**, **HDD** and **Pipe Jacking**.
Pipe Jacking	Pipe jacking is a **Trenchless** construction technique used to form small diameter tunnels without disturbing the ground surface above by pushing prefabricated pipes through the ground from a starting shaft to an exit shaft as controlled excavation is undertaken at the face. Except for the shafts at either end, the entire process takes place underground.
Pipe Jacking Compound	Temporary compound within which the **Pipe Jacking** operations takes place.
Planning Inspectorate (PINS)	The Government agency responsible for administering applications for development consent under the Planning Act 2008 (as amended) (PA2008) on behalf of the **Secretary of State** (SoS).
Planning Policy Wales (PPW)	The document that sets out Government's planning policies for Wales and how these are expected to be applied.
Planning Practice Guidance (PPG)	The Planning Practice Guidance (PPG) provides context and guidance to the **National Planning Policy Framework** (NPPF). The PPG has been updated to reflect changes to the revised NPPF.
Point of Ayr Terminal	The existing terminal facility at Point of Ayr which is currently used to process natural gas and will be repurposed as part of **the Project** to process CO_2

Term	Definition
Preliminary Ecological Appraisal (PEA)	Preliminary ecological surveys have a range of purposes; one key use is to gather data on existing conditions, often with the intention of conducting a preliminary assessment of likely impacts of proposed developments or establishing the baseline for future monitoring. As a precursor to a proposed project, some evaluation is usually made within these appraisals of the ecological features present, as well as scoping for notable **Species** or **Habitats**, identification of potential constraints to the **Proposed Development** and recommendations for **Mitigation Measures**.
Preliminary Environmental Information (PEI)	Information which has been compiled by **the Applicant** and is reasonably required for the consultation bodies to develop an informed view of the **Likely Significant Environmental Effects** of the development (and of any associated development).
Preliminary Environmental Information Report (PEIR)	The Preliminary Environmental Information Report (PEIR) is the report prepared by the Applicant, containing **Preliminary Environmental Information** (PEI).
Primary Mitigation	Modifications to the location or design of the development made during the pre-application phase that are an inherent part of the project, and do not require additional action to be taken.
Principal Aquifer	These are layers of rock or drift deposits that have high intergranular and / or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, Principal Aquifers are aquifers previously designated as major aquifers.
Priority Habitat Inventory	A spatial dataset that describes the geographic extent and location of Natural Environment and Rural Communities Act (2006) Section 41 **Habitats of Principal Importance** (HPI).
Project	See **HyNet North West**.

Term	Definition
Proposed Development	The development for which a **Development Consent Order** (DCO) is sought. In this instance, this includes: • Grinsome Road Above Ground Installation (AGI) to Alcohols Site AGI carbon dioxide pipeline; • Alcohols Site AGI to Flint AGI carbon dioxide pipeline – a section of onshore underground pipeline; • Grinsome Road AGI, Alcohols Site AGI, and Flint AGI; • Block Valve Stations (BVS) located along the existing natural gas Connah's Quay to Point of Ayr pipeline and Alcohols Site AGI to Flint AGI carbon dioxide pipeline; • Other associated AGIs – this will include Cathodic Protection (CP) transformer rectifier cabinets; • Ancillary works integral to the construction of the pipeline, including; construction compounds, temporary access tracks, and laydown area; and • Land required for the construction of the pipeline.
Ramsar Site	Wetlands of international importance designated under the Ramsar Convention 1971.
Receptor	A component of the natural, created or built environment such as a human being, water, air, a building, or a plant that has the potential to be affected by the **Proposed Development**.
Refinery Off Gas	A gas, produced as a by-product of the refining processes, the composition of which varies in line with the refining operations.
Register of Environmental Actions and Commitments (REAC)	The Register of Environmental Actions and Commitments (REAC) identifies the design, construction and operational commitments included within the Technical Chapters of the **Environmental Statement (ES)** to address the potential environmental effects of the **Proposed Development**.
Residual Effects	Effects arising from the **Proposed Development** that cannot be mitigated following implementation of **Mitigation Measures**.
Resilience (climate change)	The vulnerability of the Proposed Development to climate change.
Risk	The likelihood of an impact occurring, combined with the effect or consequence(s) of the impact on a receptor if it does occur.

Term	Definition
Risk Event	An identified, unplanned event, which is considered relevant to the **Proposed Development** and has the potential to be a **Major Accident** and/or **Disaster** subject to assessment of its potential to result in a significant adverse effect on an environmental receptor.
Rochdale Envelope	The Rochdale Envelope is an acknowledged way of dealing with an application comprising **EIA development**, where details of a project have not been fully resolved by the time the **application** is submitted. The term is used to describe those elements of a scheme that have not yet been finalised, but yet can be accommodated within certain limits and parameters allowing the likely significant effects of a project to be presented in the **Environmental Statement** as a worst case. It also provides the opportunity to assess aspects of a development where the detailed design is to be developed post grant of a **DCO** and approved by the **local planning authority** under a Requirement.
Scoping	An exercise undertaken pursuant to the **EIA Regulations**, to determine the topics to be addressed within the **Environmental Statement** (ES).
Scoping Boundary	The boundary considered to be the limits of the **Proposed Development**, as studied as part of the **Scoping Report**.
Scoping Opinion	The **Secretary of State**'s written opinion as to the scope, and level of detail, of the information to be provided in the environmental statement.
Scoping Report	A report prepared by an applicant to provide the information required under the **EIA Regulations** to request a **Scoping Opinion** from the **Secretary of State**.

Term	Definition
Secondary Aquifer	These include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary Aquifers are subdivided into two types: Secondary A - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers; Secondary B - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers. The term 'Secondary Undifferentiated' is also used in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.
Secondary Mitigation	Actions that will require further activity in order to achieve the anticipated outcome. These may be imposed as part of the planning consent, or through inclusion in the **Environmental Statement**.
Secretary of State (SoS)	In case of the **Proposed Development**, the Secretary of State for Business, Energy and Industrial Strategy (BEIS).
Significance	A measure of the importance or gravity of the effect defined by significance criteria specific to the environmental topic.
Significant Observed Adverse Effect Level (SOAEL)	The level above which significant adverse effects on health and quality of life occur as a result of noise or vibration. (see also: **Significance**).
Site	The land within the **Order Limits** that will be shown on the **Works Plans**.
Site of Importance for Nature Conservation (SINC)	Sites of Importance for Nature Conservation are usually selected within a local authority area and support both locally and nationally threatened **Habitats** and **Species** that are priorities under the county or UK Biodiversity Action Plan (BAP).

Term	Definition
Site of Special Scientific Interest (SSSI)	A site statutorily notified under the Wildlife and Countryside Act 1981 (as amended) as being of special nature conservation or geological interest. Site of Special Scientific Interest (SSSIs) include **Habitats**, geological features and **Landforms**.
Source Protection Zone 1 (SPZ 1)	Also referred to as 'inner zone'. In relation to contamination risks to groundwater sources, defined by the Environment Agency as the 50-day travel time from any point below the water table to the source. This zone has a minimum radius of 50 metres.
Special Crossing	The crossing of a pipeline of features such as watercourse, rail or road which require particular consideration with regards to the construction methods
Pipeline Strengthening Work	Replacing section of the existing **Flint-PoA pipeline** with thick-walled pipe
Special Area of Conservation (SAC)	Areas of protected habitats and species as defined in the **Habitats Directive**.
Special Protection Area (SPA)	Sites classified in accordance with Article 4 of the EC Birds Directive (79/409/EEC) which came into force in April 1979. They are classified for rare and vulnerable birds (as listed on Annex 1 of the Directive), and for regularly occurring migratory Species.
Species	A group of interbreeding organisms that seldom or never interbreed with individuals in other such groups, under natural conditions; most species are made up of subspecies or populations.
Stanlow Refinery	The Essar refinery located at Stanlow at Ellesmere Port.
Stringing	Placing joints of pipe end to end along a pipeline right of way in preparation for laying, i.e., screwing or welding the joints together to form the pipeline.
Study Area	The area around the **Scoping Boundary** within which impacts could occur and therefore within which specialist assessment is undertaken.
Survey Area	The area within which environmental surveys are undertaken.

Term	Definition
Statutory Consultation	The Planning Act 2008 (as amended) (PA 2008) requires an applicant to undertake public consultation in advance of submitting a **Development Consent Order** (DCO) application to the **Secretary of State** (SoS). Statutory consultation must occur with 'statutory consultees' and the formal consultation period will normally last for 21 days.
Statutory Consultees	Planning law prescribes circumstances where the **Secretary of State** is required to consult specified bodies prior to a decision being made on an application. Includes bodies such as: Environment Agency, Highways England, Historic England, Natural England, Parish Councils, among others.
Statement of Community Consultation	The Planning Act 2008 (as amended) (PA2008) requires an applicant to undertake public consultation in advance of submitting a **Development Consent Order** (DCO) application to the **Secretary of State** (SoS). A **Statement of Community Consultation** (SoCC) must be prepared, setting out how **the Applicant** proposes to consult people living in the vicinity of the **Proposed Development.**
Survey Buffer	An area additional to the core **Survey Area** within which surveys may be required.
Synthetic Natural Gas	A substitute natural gas produced from biomass, with a composition compliant with the Gas Safety (Management) Regulations 1996 (GSMR).
Temporary Works	Those parts of the works that allow or enable construction of the **Proposed Development** and which do not remain in place at the completion of the works.
Temporary Vent Stack	A temporary stack which would be installed at a **Block Valve Station (BVS)** or **Above Ground Installation (AGI)**, to allow the isolate section of the pipe to be depressurised
Tertiary Mitigation	Actions that would occur with or without input from the **EIA** feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental **Effects**.

Term	Definition
Town and Country Planning Act	The Town and Country Planning Act 1990 (as amended) gives **Local Planning Authorities** in England and Wales the power to regulate and grant permission for local development. It is used to permit development for the **Project** which does not fall under the **Planning Act** 2008.
Townscape	The character and composition of the built environment including the buildings and the relationships between them, the different types of open urban space, including green spaces, and the relationship between buildings and open spaces.
Transect	Survey technique for surveying birds, wintering birds and breeding birds, with surveyors walking pre-defined routes.
Trenchless	Trenchless technology is the science and engineering of installing underground pipes using techniques which minimise the amount of excavation and associated environmental disturbance associated with **Open Cut** techniques
Visual Amenity	Overall enjoyment of a particular area, surroundings, or views in terms of people's activities - living, recreating, travelling through, visiting, or working.
Visual Effect	An effect on specific views and on the general visual amenity experienced by people.
Visual Receptor	Individuals and / or defined groups of people who have the potential to be affected by the **Proposed Development.**
Vulnerability	In the context of the 2014 EU Directive, the term refers to the 'exposure and resilience' of the **Proposed Development** to the risk of a major accident and/or disaster. Vulnerability is influenced by sensitivity, adaptive capacity and magnitude of impact.
Waste	Any substance or object which the holder discards or intends or is required to discard
Waste Hierarchy	Sets out the priorities that must be applied when managing waste.
Water Framework Directive (WFD)	European directive which commits member states to achieve good qualitative status of all water bodies.
Water Body	A discrete body of water forming a physical **Feature**.

Term	Definition
Wetlands	Areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres.
Wildlife and Countryside Act 1981 (as amended)	The principal piece of UK legislation relating to the protection of wildlife.
Working Width	The temporary boundary within which **Pipeline Construction Activities** are expected to take place.
Zone of Influence (ZOI)	The areas / resources that may be affected by the changes caused by activities associated with a project.
Zone of Theoretical Visibility (ZTV)	A map, digitally produced, showing areas of land within which, the Proposed Development is theoretically visible.

ABBREVIATIONS

Abbreviation	Definition
µg	Microgram
AADT	Annual Average Daily Traffic
AD	Anno Domini
ADMS	Advances Dispersion Modelling Software
AGI	Above Ground Installation
ALARP	As Low as Reasonably Practicable
ALC	Agricultural Land Classification
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
ASSI	Area of Special Scientific Interest
ATC	Automatic Traffic Count
AWI	Ancient Woodland Inventory
BAT	Best Available Techniques
BGS	British Geological Society
BMV	Best and Most Versatile agricultural land
BOAT	Byways Open to All Traffic
BPM	Best Practicable Means
BSI	British Standards Institution
BTO	British Trust for Ornithology
BVS	Block Valve Stations
CA	Conservation Area

Abbreviation	Definition
CBRN	Chemical, Biological, Radiological and Nuclear
CCC	Committee on Climate Change
CCS	Carbon Capture and Storage
CD	Consultation Distance
CDE	Construction, Demolition and Excavation
CDM	Construction (Design and Management)
CEMP	Construction Environmental Management Plan
CHER	Cheshire Historic Environment Record
CIEEM	Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologists
CIRIA	Construction Industry Research and Information Association
CL:AIRE	Contaminated Land: Applications in Real Environments
CME	Coronal mass ejections
CO_2	Carbon dioxide
COMAH	Control of Major Accidents and Hazards
CoSHH	Control of Substances Hazardous to Health
CPAT	Clwyd-Powys Archaeological Trust
CP	Cathodic Protection
CTMP	Construction Traffic Management Plan
CWCC	Cheshire West and Chester Council
CWT	Cheshire Wildlife Trust
dB	Decibel
DCO	Development Consent Order

Abbreviation	Definition
DECC	Department for Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
DTM	Digital Terrain Model
EA	Environment Agency
EC	European Commission
EcIA	Ecological Impact Assessment
eDNA	Environmental DNA
EIA	Environmental Impact Assessment
END	Environmental Noise Directive
EPC	Engineering, Procurement and Construction
EPD	Environmental Product Declarations
EPUK	Environmental Protection UK
ES	Environmental Statement
ESG	Environmental, social and governance
EU	European Union
ExA	Examining Authority
FCA	Flood Consequence Assessment
FCC	Flintshire County Council
FRA	Flood Risk Assessment
GCN	Great Crested Newt
GCR	Geological Conservation Review

Abbreviation	Definition
GGBS	Ground Granulated Blast-furnace Slag
GIS	Geographic Information Systems
GHG	Greenhouse Gas
GSMR	Gas Safety (Management) Regulations 1996
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GPS	Global Positioning System
GWDTE	Ground Water Dependent Terrestrial Ecosystem
H&S	Health and Safety
ha	Hectare
HASWA	Health and Safety at Work Act
HAZID	Hazard Identification Studies
HDD	Horizontal Directional Drill / Drilling
HE	Highways England
HEDBA	Heritage Environmental Desk Based Assessment
HER	Historic Environment Record
HGV	Heavy Goods Vehicle
HIA	Health Impact Assessment
HM	Her Majesty’s
HMG	Her Majesty’s Government
HPI	Habitats of Principle Importance
HSE	Health and Safety Executive
IA	Noise Important Areas
IAQM	Institute of Air Quality Management

Abbreviation	Definition
IEMA	Institute of Environmental Management and Assessment
$ktCO_2$	Total greenhouse gas emissions
LA90 dB	Background Sound Level
LAeq, T dB	Equivalent Continuous Sound Level
LAQM	Local Air Quality Management
LCRM	Land Contamination: Risk Management
LDP	Local Development Plan
LGV	Light Goods Vehicle
LI	Landscape Institute
LIDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
Lmax	Highest Measured Sound Pressure Level
Lmin	Lowest Measured Sound Pressure Level
LNR	Local Nature Reserve
LOAEL	Lowest Observed Adverse Effect Level
LPA	Local Planning Authority
LRN	Local Road Network
LSOA	Lower Layer Super Output Area
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
MA&D	Major Accidents and Disasters
MAGIC	Multi Agency Geographic Information for the Countryside
MCZ	Marine Conservation Zone

Abbreviation	Definition
MMP	Materials Management Plan
$MtCO_2e$	Millions of tonnes of carbon dioxide equivalent
N/A	Not Applicable
NAPPA	Noise Action Plan Priority Areas
NCA	National Character Area
NCN	National Cycle Network
NE	Natural England
NERC	Natural Environment Research Council
NMWTRA	North and Mid Wales Trunk Road Agent
NNR	National Nature Reserve
NO2	Nitrogen dioxide
NOEL	No Observed Effect Level
NOx	Nitrogen oxides
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NRW	Natural Resources Wales
NSIP	Nationally Significant Infrastructure Project
NTS	Non-Technical Summary
NVQ	National Vocatioanl Qualification
NWWT	North Wales Wildlife Trust
ONS	Office for National Statistics

Abbreviation	Definition
PEA	Preliminary Ecological Appraisal
PEI	Preliminary Environmental Information
PEIR	Preliminary Environmental Information Report
PHE	Public Health England
PIA	Personal injury accident data
PIG	Pipeline Inspection Gauge
PINS	Planning Inspectorate
PM	Particulate Matter
PM10	Particulate Matter with an aerodynamic diameter of less than 10 micrometres
PM2.5	Particulate Matter with an aerodynamic diameter of less than 2.5 micrometres
PoA	Point of Ayr
PPE	Personal Protective Equipment
PPG	Planning Practice Guidance
PPW	Planning Policy Wales
PRoW	Public Right of Way
RBMP	River Basin Management Plan
RCP	Representative Concentration Pathway
REAC	Register of Environmental Actions and Commitments
RICS	Royal Institute of Chartered Surveyors
RIGS	Regionally Important Geological Site
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation

Abbreviation	Definition
SINC	Site of Importance for Nature Conservation
SOAEL	Significant Observed Adverse Effect Level
SoCC	Statement of Community Consultation
SoS	Secretary of State
SPA	Special Protection Area
SPZ	Source Protection Zone
SRN	Strategic Road Network
SSSI	Site of Special Scientific Interest
SWMP	Site Waste Management Plan
SuDS	Sustainable Drainage System
TAN	Technical Advice Note
TCPA	Town and Country Planning Act
TGN	Technical Guidance Note
TPO	Tree Preservation Order
UK	United Kingdom
UKCP	UK Climate Projections
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UXO	Unexploded Ordnance
WCH	Walkers, Cyclists and Horse Riders
WFD	Water Framework Directive
WFDUKTAG	Water Framework Directive – United Kingdom Technical Advisory Group
ZOI	Zone of Influence
ZTV	Zone of Theoretical Visibility

1. INTRODUCTION

1.1. BACKGROUND

1.1.1. Liverpool Bay CCS Limited (the 'Applicant') intends to build a new underground carbon dioxide pipeline from Cheshire, England to Flintshire, Wales and associated Above Ground Installations (AGI) (the 'Proposed Development').

1.1.2. The Proposed Development will form part of the HyNet North West Project (the 'Project'). The aim of the Project is to reduce carbon dioxide emissions from industry, homes and transport and support economic growth in the North West of England and North Wales. The Project will include infrastructure to produce and distribute low carbon hydrogen. The hydrogen is produced using natural gas, with the resultant carbon dioxide emissions captured and stored.

1.1.3. The Proposed Development does not include infrastructure to produce hydrogen or to capture and store carbon dioxide emissions. The Proposed Development includes infrastructure to facilitate the transportation of carbon dioxide which will be captured from proposed hydrogen production facilities and existing industrial sources in the North West of England and North Wales and stored in existing depleted oil and gas fields in Liverpool Bay.

1.1.4. The Proposed Development is classified as a Nationally Significant Infrastructure Project (NSIP) and will require a Development Consent Order (DCO) under the Planning Act 2008 ('PA2008'). The Proposed Development also falls within the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('EIA Regulations 2017'), which require an Environmental Statement (ES) to be prepared and submitted with the application for development consent.

1.1.5. WSP UK Ltd ('WSP') has been commissioned by the Applicant to prepare an Environmental Impact Assessment (EIA) Scoping Report for the Proposed Development. This EIA Scoping Report has been prepared to accompany a request for a Scoping Opinion from the Planning Inspectorate (prepared on behalf of the Secretary of State). It provides the information necessary to accompany such a request and will inform both the Scoping Opinion and formal consultation with statutory environmental bodies by the Planning Inspectorate on the request.

1.2. DEFINITION OF AN EIA

1.2.1. The term EIA describes a procedure that must be followed for certain types of project before it can be given 'consent'. The procedure is a means of drawing together, in a systematic way, an assessment of a project's likely significant environmental effects. This helps to ensure that the importance of the predicted effects and the scope for avoiding, preventing, reducing or, if possible, offsetting them are properly understood by the public and the authority granting consent before it makes its decision.

1.3. REQUIREMENT FOR A DCO

1.3.1. The Proposed Development is defined as a NSIP as set out in the PA2008, Section 14(1)(g) and Section 21. As such, the Applicant is required to request a DCO in order to construct and operate the Proposed Development.

1.3.2. The NSIP will comprise:

- A system of pipelines for the conveyance of carbon dioxide, and apparatus and works associated therewith;
- Ancillary works integral to the construction of the pipeline, including; construction compounds, temporary access tracks, and laydown area; and
- Land required for the construction of the pipeline.

1.3.3. The Department for Energy and Climate Change (now the Department for Business, Energy and Industrial Strategy) published a number of National Policy Statements (NPS) in relation to energy infrastructure, which were designated by the Secretary of State for Energy and Climate Change in July 2011.

1.3.4. In the case of the Proposed Development, none of the energy NPSs directly apply. Where this is the case, section 105 of the PA2008 applies and applications will be tested against 'important and relevant' matters, which are typically local adopted planning policies and the National Planning Policy Framework (NPPF).

1.3.5. However, the following NPSs may still be important and relevant considerations in assessing the Proposed Development:

- Overarching National Policy Statement for Energy (EN-1); and
- National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4).

1.3.6. NPS EN-4 applies to nationally significant infrastructure pipelines which transport natural gas or oil. However, NPS EN-4 notes that the information provided within may also be useful in identifying impacts to be considered in applications for pipelines intended to transport other substances.

1.4. REQUIREMENT FOR EIA

1.4.1. The Proposed Development falls under Schedule 1, paragraph 16 and 23 of the EIA Regulations 2017:

'16. Pipelines with a diameter of more than 800 millimetres and a length of more than 40 km for the transport of–

(a) Gas, oil or chemicals;

(b) Carbon dioxide streams for the purposes of geological storage, including associated booster stations.'

1.4.2. The Proposed Development has not been subject to an EIA Screening Request or Opinion, as all development listed within Schedule 1 is automatically classified as EIA development under the EIA Regulations 2017.

1.4.3. A Regulation 8 (of the EIA Regulations 2017) notification has been submitted to the Secretary of State (SoS) along with this EIA Scoping Report and confirms that the Applicant intends to submit a DCO Application in Q3 2022.

1.5. PURPOSE OF THE EIA SCOPING REPORT

1.5.1. The purpose of this report is to ensure that the subsequent EIA is focused on the key impacts likely to give rise to significant adverse effects, and to obtain agreement on the EIA approach and scope. As well as identifying elements to be considered in the EIA, this report also identifies those elements that are not considered necessary to assess further. This approach is in line with the general aim to undertake proportionate EIA, as advocated by industry best practice and as set out in paragraph 5.10 of the Planning Inspectorate's (PINS) Advice Note 7 (Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements).

1.5.2. This report seeks to establish the overall framework for the EIA in relation to the environmental factors and associated effects and the Environmental Statement (ES) will be based on the Scoping Opinion received. However, the exact scope of the EIA will be influenced by the on-going design evolution of the Proposed Development, baseline data collection (e.g. field surveys etc.) and consultation with stakeholders. Where further evidence justifies a change to the scope of the EIA, this will be explained in the ES along with confirmation of whether the change has been agreed with relevant consultees.

1.5.3. Table 1-1 sets out what information the EIA Regulations 2017 (Regulation 10(3)) state that a request for a Scoping Opinion must include and where this information can be found in this report.

Table 1-1: Information Required to Accompany a Request for a Scoping Opinion

Information Required	Location within this Report
A plan sufficient to identify the land	**Figures 3-1** to **3-8 (Appendix A)**
A description of the nature and purpose of the development, including its location and technical capacity	**Chapter 3** of this report.
An explanation of the likely significant effects of the development on the environment	**Chapters 5** to **Chapter 16**

1.5.4. In addition to the above, Regulation 10(3) of the EIA Regulations also requires '*such other information or representations as the person making the request may wish to provide or make'*. This additional information is set out in Table 1-2.

Table 1-2: Other Information Provided within this EIA Scoping Report

Information Required	Location within this Report
An overview of the conditions presents on site and in the surrounding area, together with a brief overview of the relevant planning policy context	**Chapters 5** to **Chapter 16**
Outline of the scope and assessment methodology (including the significance criteria to be adopted) for assessing the likely significant environmental effects to be employed for each aspect to be reported in the ES.	**Chapter 4**
The approach to dealing with alternatives	**Chapter 4**
The approach to undertaking the cumulative assessment	**Chapter 17**
The proposed approach to the EIA and an appraisal of the key environmental aspects and matters to be covered in the EIA (i.e. "scoped in") and the aspects and matters not requiring further consideration (i.e. "scoped out").	**Chapters 5** to **Chapter 16** and **Chapter 18**

Information Required	Location within this Report
The proposed structure and format of the ES which will comprise four main parts: • Volume I: Non-Technical Summary; • Volume II: Main Text; • Volume III: Supporting Technical Appendices; and • Volume IV: Supporting Figures and Plans.	**Chapter 4**

1.5.5. The outputs of the EIA will be two-fold:

- A Preliminary Environmental Information Report (PEIR), produced in connection with the formal statutory consultation on the Proposed Development. The PEIR will present the current understanding of the potential likely significant effects of the Proposed Development at the time of the consultation and its purpose will be to provide information that enables interested parties, including members of the public, local authorities and statutory bodies, to understand the likely environmental effects so that they can provide meaningful feedback; and
- The PEIR will be followed by the ES, which will be produced in support of the Application. The ES will report on a detailed assessment of the likely significant effects resulting from the Proposed Development and the proposed mitigation measures.

2. OVERVIEW OF HYNET NORTH WEST (THE PROJECT)

2.1. INTRODUCTION TO THE PROJECT

2.1.1. The UK Government and Welsh Government have set legally binding net-zero carbon dioxide (CO_2) emissions targets in response to the global climate emergency. This means that by 2050, any CO_2 emissions to the atmosphere must be offset by equivalent emissions removal.

2.1.2. HyNet North West ('the Project') is a hydrogen supply and Carbon Capture and Storage (CCS) project. The goal of the Project is to reduce carbon dioxide emissions from industry, homes and transport and support economic growth in the North West of England and North Wales.

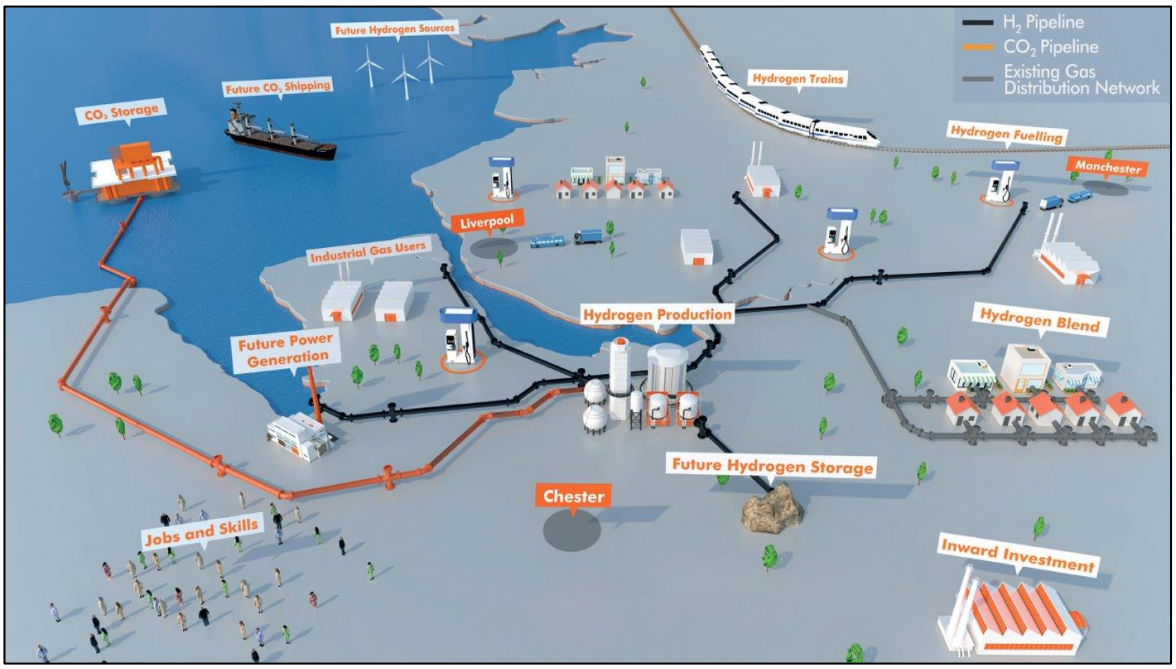
2.1.3. The Project is based on the production of low carbon Hydrogen from natural gas. It includes the development of a new hydrogen production plant, pipeline and the creation of CCS infrastructure. CCS prevents CO_2 entering the atmosphere by capturing it, compressing it and transporting it for safe, permanent storage.

2.1.4. Hydrogen is not itself an energy source and must be produced using other sources of energy, such as wind generated electricity used to split water via electrolysis, or conversion of hydrocarbon sources (e.g. reforming of natural gas, or, potentially, conversion of renewable biomass). Where the source is from fossil resources, then no carbon benefit is conferred unless the carbon is captured such that carbon dioxide is not released to the atmosphere.

2.1.5. Hydrogen will be sent via new pipelines to a range of industrial sites, for injection as a blend into the existing natural gas network and for use as a transport fuel. Resulting CO_2 will be captured and, together with CO_2 from local industry, which is already available, sent by pipeline for storage offshore in the nearby Liverpool Bay gas fields.

2.1.6. A schematic representation of the Project is shown in **Figure 2-1**.

Figure 2-1: Indicative Representation of the Project



KEY COMPONENTS OF THE PROJECT

2.1.7. Delivery of the Project will be implemented in phases. The key components of the Project are briefly described as follows:

- **Hydrogen Production Plants**: The development and deployment of hydrogen production and supply facilities across the North-West region. A tranche of hydrogen production plants are envisaged by 2030 to provide 30TWh/yr of low carbon Hydrogen supply for the region;
- **Hydrogen Network**: The development and deployment of hydrogen distribution infrastructure, in the form of underground pipelines, to transport hydrogen from the hydrogen production plants to the point of use across the North West region and North Wales.
- **Hydrogen Storage**: The development and deployment of hydrogen storage facilities, in the form of bulk underground storage in caverns to accommodate diurnal and seasonal demand fluctuations for heat and flexible power generation;
- **Carbon Capture**: The development and deployment of CCS infrastructure to capture, transport and store carbon dioxide from a range of existing and new-build industrial sources and from the hydrogen production plants;
- **Newbuild and repurposed onshore/offshore pipelines to transport Carbon Dioxide (between Cheshire, Flintshire, and offshore)**: A proposed network of underground onshore and buried subsea pipelines would transport CO_2 produced and captured by future hydrogen producing facilities and existing industrial premises in North West England and North Wales for permanent offshore storage;

- **Compressor Plants**: The existing gas treatment plant at Point of Ayr will be redeveloped for service as part of the CO_2 transport and storage system. In addition, an onshore compressor plant will be required to compress the gas to sufficient pressure to allow transport to the offshore storage facility;
- **Offshore Carbon Dioxide Storage**: Captured CO_2 will be stored permanently in an area located within the Liverpool Bay area of the East Irish Sea;
- **Future Carbon Dioxide Pipeline (between Flint, Flintshire, and Point of Ayr, Flintshire)**: A new carbon dioxide pipeline would be required in response to increased hydrogen production (and therefore CO_2 production) and additional industrial capture to meet increased CO_2 transportation demand.

2.2. CARBON CAPTURE AND STORAGE (CCS) INFRASTRUCTURE

2.2.1. The development and installation of CCS infrastructure will form an integral part of the Project.

2.2.2. Carbon dioxide will be captured from existing industrial sources, including the Stanlow Refinery Plant and CF Fertiliser Plant, before being compressed, transported via a pipeline network, and stored in existing oil and gas fields in Liverpool Bay.

2.2.3. The Application will seek consent for the construction and operation of the following components which form part of the CCS infrastructure:

- Grinsome Road Above Ground Installation (AGI) to Alcohols Site AGI carbon dioxide pipeline – a section of onshore pipeline (up to 20” in diameter) to transport CO_2 from the Grinsome Road AGI (located in the vicinity of the CF Fertilisers plant, Cheshire, England) to the Alcohols Site AGI (located within the Stanlow Refinery site east of Ellesmere Port, Cheshire, England);
- Alcohols Site AGI to Flint AGI carbon dioxide pipeline – a section of onshore pipeline (up to 36” in diameter) to transport CO_2 from the Alcohols Site AGI to the Flint AGI (located on land north-west of Connah’s Quay and south of Flint, Flintshire, Wales);
- Grinsome Road AGI, Alcohols Site AGI, and Flint AGI;
- Block Valve Stations (BVS) located along;
  - the Flint-PoA pipeline; and
  - the proposed Alcohols Site AGI to Flint AGI carbon dioxide pipeline; and
- Other associated AGIs – this will include Cathodic Protection (CP) transformer rectifier cabinets.

2.2.4. The components outlined above form the Proposed Development. The Proposed Development is described in greater detail in **Chapter 3**.

2.2.5. The following components also form part of the CCS infrastructure but will be delivered under separate consenting routes:

- Modifications to the Stanlow Refinery Plant and CF Fertilisers Plant to enable captured carbon dioxide to enter the new pipeline;
- Carbon dioxide gathering network comprising connecting pipes between existing plants and a new AGI located at the Stanlow Refinery site; and
- Existing Pipeline Works, comprising:
  - Repurposing the Flint-PoA pipeline to transport carbon dioxide. This may include diversionary and strengthening works, and new BVS (the proposed BVS also form part of the Application); and
  - Modifications to the existing Point of Ayr Gas Terminal site.

2.2.6. The operation of the Proposed Development will be dependent on the delivery of the Existing Pipeline Works outlined in Section 2.2.5 (third bullet). With the exception of the proposed BVS's, the Application will not be seeking development consent for the construction and operation of the Existing Pipeline Works, which will be sought separately by way of planning permission. This reflects the fact that including associated development in the DCO is not available to the Welsh part of the Proposed Development. It is, however, considered by the BVS's can legitimately be considered as integral to the NSIP. Accordingly, these are to be included within the DCO application (though, as a precaution, they will also be the subject of a separate planning application). The Application will also be seeking to obtain compulsory powers relating to the acquisition of land/rights and other powers connected to the use of the existing pipeline for the transport of carbon dioxide.

2.2.7. Documentation prepared in support of the Proposed Development, including the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES), will carefully explain the inter-relationships of the Proposed Development and remaining CCS components (delivered under other consents).

2.2.8. Please refer to **Chapter 17** for further details on how this will be considered as part of the cumulative assessment.

3. DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1. INTRODUCTION

3.1.1. This chapter provides a description of the Proposed Development for the purposes of identifying and reporting the potential environmental impacts and likely significant effects in this Scoping Report.

3.1.2. The description of the Proposed Development represents the current understanding of the design envelope and parameters. However, as part of an on-going design process, the detail provided in this chapter will be further refined for the PEIR. Following Statutory Consultation, a further update to the description of the Proposed Development will be included the ES which will confirm the details for which consent will be sought. This will include the final design parameter and any limits of deviation.

3.1.3. The final built form and layout of the Proposed Development, as well as the installation / construction methods to be utilised, will, eventually, be determined by the chosen contractor(s). However, all works will be required to be undertaken within the parameters assessed for the Proposed Development. With this in mind, the EIA will represent a 'worst-case', ensuring a robust assessment of the likely significant effects.

3.2. SCOPING BOUNDARIES

OVERALL CONTEXT

3.2.1. This Scoping Report has been informed by the scoping boundaries (Newbuild Infrastructure Scoping Boundary & Existing Pipeline Scoping Boundary) shown in **Figure 3-1 (Appendix A)**.

3.2.2. A set of more detailed 1:27,500 scale plans are provided in **Figures 3-2** to **3-6 (Appendix A)**.

NEWBUILD INFRASTRUCTURE SCOPING BOUNDARY

3.2.3. The Newbuild Infrastructure Scoping Boundary extends from the Grinsome Road AGI to the Flint AGI (Flintshire, Wales) and includes the four BVS located along the Flint-PoA pipeline.

3.2.4. The Newbuild Infrastructure Scoping Boundary is based on an approximate 100m-wide corridor and is considered to be the maximum extent of all potential permanent and temporary construction works required as part of the Proposed Development. These works are presented in **Section 3.5** and **3.6**.

3.2.5. As part of the iterative design process, further work will be undertaken to identify the land that will be required for temporary construction compounds, laydown/storage areas, and access/haul routes.

3.2.6. Design of the Proposed Development and temporary construction work is not yet complete, and as such, it is possible that some elements of the final design may fall outside of the current boundary. However, all potential effects from expected development and construction activities have been considered within the Scoping Report.

EXISTING PIPELINE SCOPING BOUNDARY

3.2.7. The Existing Pipeline Scoping Boundary extends from the Flint AGI (Flintshire, Wales) to the Point of Ayr (Flintshire, Wales) as far as Mean Low Water Springs. The Existing Pipeline Scoping Boundary is considered to be the maximum extent of land required to facilitate works associated with the Existing Pipeline Works.

3.2.8. As part of the iterative design process for the Existing Pipeline Works, further work will be undertaken to identify the land that will be required for temporary construction compounds, laydown/storage areas, and access/haul routes.

3.2.9. Design of the Proposed Development and temporary construction work is not yet complete, and as such, it is possible that some elements of the final design may fall outside of the current boundary. However, all potential effects from expected development and construction activities have been considered within the Scoping Report.

3.3. DEVELOPMENT ENVELOPE / DESIGN PARAMETERS

3.3.1. In order to define the Proposed Development and determine where detail is to be included at application stage and where it may be deferred until after consent is granted, the Applicant will identify the level of flexibility required; e.g. in relation to the width of the pipeline corridor or construction methods.

3.3.2. Many promoters of NSIPs seek to maximise flexibility in their consents, given the long lead in times to consent and subsequent engagement of EPC (engineering, procurement, and construction) contractors. This is particularly the case under the PA2008 where the process for post consent amendments can add unnecessary costs and delays to project delivery. It is typical for a DCO (especially linear schemes) to contain the ability to alter the final design of a scheme by having “limits of deviation”.

3.3.3. The Planning Inspectorate’s (PINS) Advice Note 9 (2018) ‘Using the Rochdale Envelope’ provides specific guidance to applicants on the degree of flexibility that could be considered appropriate under the PA2008 regime.

3.3.4. The Rochdale Envelope is an acknowledged way of dealing with an application comprising EIA development, where details of a project have not been fully resolved by the time the application is submitted. The term is used to describe those elements of a scheme that have not yet been finalised, but yet can be accommodated within certain limits and parameters allowing the likely

significant effects of a project to be presented in the ES as a worst case. It also provides the opportunity to assess aspects of a development where the detailed design is to be developed post grant of a DCO and approved by the local planning authority under a Requirement.

3.3.5. Furthermore, such flexibility may be useful where a change in the design or capacity of the Proposed Development is anticipated, but not yet certain. For example, the Proposed Development forms part of the Project (as described in **Chapter 2**). The design and technological requirements of the Project may have an impact on the design and programming of the Proposed Development. Therefore, it may be possible that a particular element of the design will be subject to on-going technological advancements. It will be important that a lack of flexibility in the Application does not unduly hinder the Applicant's ability to consider and adopt such future technological advancements.

3.3.6. The NPSs provide further guidelines on flexibility and should be referred to in justifying the amount of design detail contained within an application. The National Infrastructure Planning Association (NIPA) has published papers on striking the right balance between design detail and flexibility in DCOs and their recommendations for best practice should be considered in preparing DCO applications.

3.3.7. Design parameters will be developed for statutory consultation and presented in the PEIR. Final parameters and limits of deviation will be presented in the ES, draft Order and works plans.

3.4. DESIGN EVOLUTION

CONTEXT AND APPROACH

3.4.1. This section provides an overview of the approach taken to development a newbuild pipeline which, in combination with existing pipelines, would transport carbon dioxide captured from existing industrial sources in the North West of England and North Wales for storage in existing oil and gas fields in Liverpool Bay.

3.4.2. A description of the design evolution and assessment of these alternative options will be presented in greater detail in the Assessment of Alternatives in the PEIR and ES.

3.4.3. There were two main project objectives used to underpin the framework for developing the newbuild pipeline:

- To deliver a pipeline capable of transporting carbon dioxide from new hydrogen production facilities at Stanlow Refinery Site and other local process emitters to a Carbon Dioxide Storage location within Liverpool Bay; and
- To maximise the opportunity to substantially reduce carbon dioxide emissions from industry within North-West England and North Wales - by ensuring any pipeline provides the opportunity for all major emitters to connect.

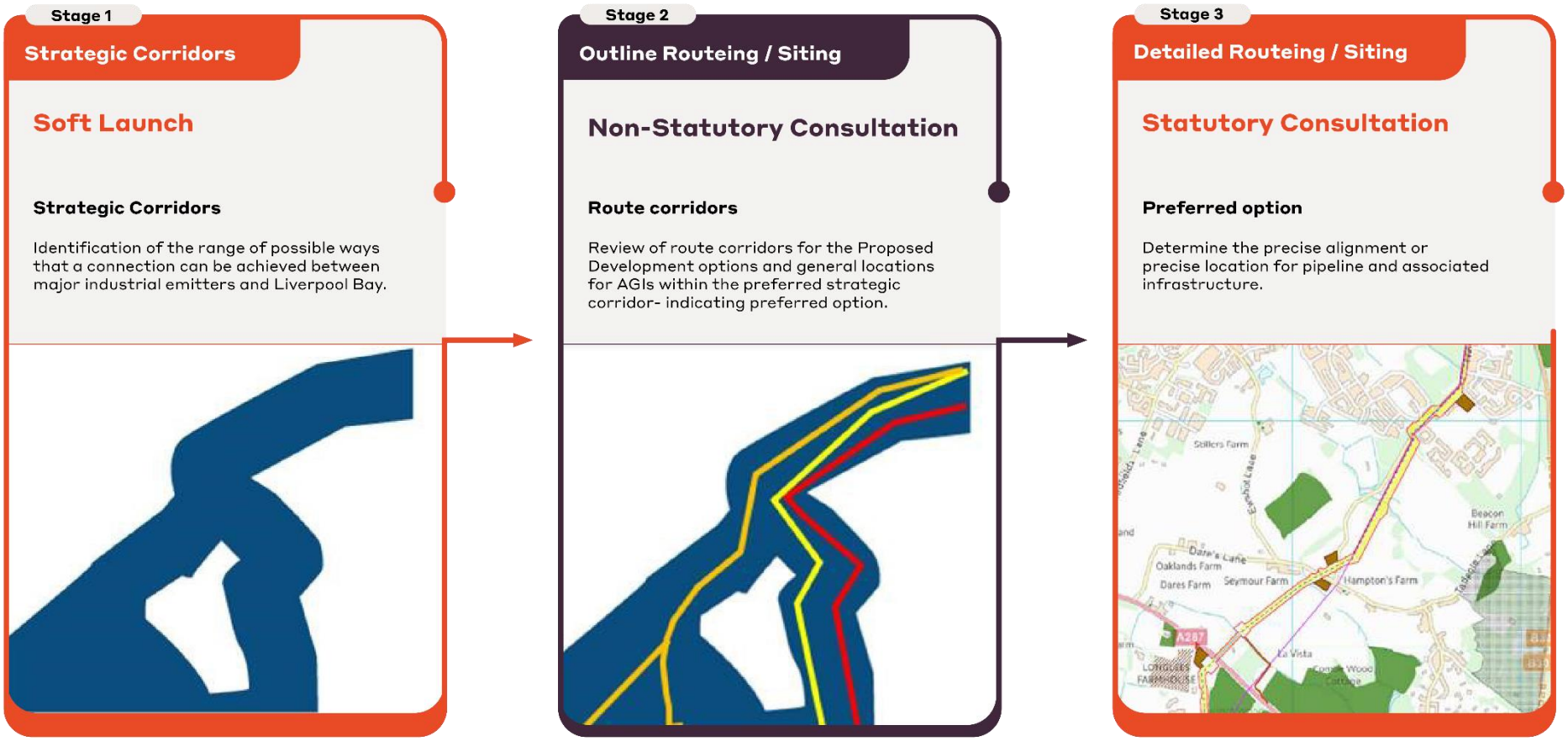
3.4.4. In addition, the following guiding principles were developed:

- To avoid, minimise and manage impacts upon the environment and local amenity;
- To ensure the transportation of the carbon dioxide is undertaken safely and securely;
- To optimise the potential local socio-economic benefits within the region;
- To be technically viable and constructible with minimum disruption; and
- To be cost-effective.

3.4.5. A three-stage appraisal process, as shown in **Figure 3-15**, has been developed to help identify the preferred route option for the newbuild onshore pipelines being considered as part of the Proposed Development, namely:

- Stage 1: Development of strategic corridors;
- Stage 2: Development of route options; and
- Stage 3: Refinement of route options.

Figure 3-15: Carbon Dioxide Pipeline Options Appraisal Stages and Outputs



3.4.6. The appraisal methodology has drawn on best practice adopted by National Grid in developing new gas and electricity infrastructure (**Ref. 3-1**), intended primarily for major infrastructure projects under the PA2008. The National Grid guidance sets out the importance of a robust and transparent process as well as balancing the technical socio-economic, environmental and cost considerations when selecting a project option. The methodology has been informed by NPS EN-1 (**Ref. 3-2**) which states that:

> "*applicants are obliged to include in their ES, as a matter of fact, information about the main alternatives they have studied. This should include an indication of the main reasons for the applicant's choice, taking into account the environmental, social and economic effects and including, where relevant, technical and commercial feasibility*"

3.4.7. Having a process in place that enables a coherent and consistent appraisal of potential options to be undertaken, also allows for 'back-checking' of any options at a later date. The back-checking of options will be triggered if new material information or a material change in circumstances comes to light which warrants a reconsideration of previously discontinued options. Any new options identified on the back of new material information or a material change would need to be appraised against the same criteria.

STAGE 1: DEVELOPING CARBON DIOXIDE PIPELINE STRATEGIC CORRIDORS

3.4.8. The newbuild pipeline was considered in two sections; Grinsome Road AGI to Alcohols Site AGI carbon dioxide pipeline and Alcohols Site AGI to Flint AGI carbon dioxide pipeline.

3.4.9. Through the application of the objectives and guiding principles, four strategic corridors were defined within which the newbuild pipelines from the Alcohols Site AGI to Flint AGI (Flintshire) would be located. The four strategic corridors are presented in **Figure 3.16 (Appendix A)**.

3.4.10. Due to its shorter length and limited corridor options, the newbuild pipeline from the CF Fertilisers Plant (Cheshire) to the Stanlow Refinery Site was not subject to a Stage 1 appraisal.

3.4.11. The first of the four defined corridors was labelled the 'Core' corridor. This is the broadest of the four corridors on account of being the least geographically constrained. The core corridor runs approximately 13km between Stanlow and the A548, located approximately 1km over the border between England and Wales. It is at this point that the strategic corridors can be seen to split into three more distinct corridors:

- Northern corridor: Measuring approximately 8.5km in length, the northern corridor traversed the northern perimeter of the Deeside Industrial Estate.

- Central corridor: Measuring approximately 7.5km in length, the Central Corridor ran through an area of open fields adjacent to Garden City and the Airfield Industrial Estate (currently under construction) before heading northwards along the western side of the River Dee.
- Southern corridor: Measuring approximately 15km in length, the southern corridor arced south of Deeside, Queensferry and Connah's Quay.

3.4.12. The widths of the corridors varied, primarily due to the application of key geographical constraints such as the avoidance, as far as possible, of centres of population and significant environmental features.

3.4.13. A qualitative appraisal of the three corridors (Northern, Central, and Southern) was undertaken to identify which corridor should be taken forward for further design development. The Core corridor was not subject to the Stage 1 appraisal process on account of there being no significant constraints that would have warranted the division of this corridor into separate corridors.

3.4.14. Any individual corridor was considered as having an advantage over other alternatives if it:

- Was **better located**, i.e. provided more opportunities to connect to existing industrial emitters, would utilise more existing infrastructure, would pass through less complex or built-up areas (where possible), and/or minimise land take and the need for compulsory acquisition;
- Would be likely to have **better environmental outcomes** versus the other options considered, especially relating to internationally and nationally important features;
- Would provide **social and economic outcomes of greater benefit** compared to the other corridors;
- Would provide a **better business case**, i.e. could be installed at reasonable construction and operational cost, with fewer engineering constraints.

3.4.15. The **Northern** and **Central** corridors contained a significant number of constraints and construction risks and a distinct lack of flexibility and opportunities. This posed a significant risk for the detailed routing of the Proposed Development and subsequent construction program.

3.4.16. Overall, the **Southern** corridor was considered to be the preferred option for a number of reasons, including:

- Offer the greatest opportunity to connect to other carbon dioxide emitters, thereby achieving the greatest level of carbon dioxide reduction within the region;
- Likely to be the least complex to build and safest route to construct on account of having fewer complex crossings;

- More likely to provide route options which have less direct impact upon international and national environmental designations; and
- Likely to offer the most cost-effective solution, based on the fact it would be the least complex.

3.4.17. The **Core corridor in combination with the Southern corridor** were taken forward to the Stage 2 Appraisal for the Alcohols Site AGI to Flint AGI carbon dioxide pipeline.

STAGE 2: DEVELOPING THE CARBON DIOXIDE PIPELINE ROUTE OPTIONS

3.4.18. The Stage 2 appraisal framework was developed using the objectives and guiding principles, with each broken down further to include a series of 35 'factors' and associated 'criteria' which allow for a more detailed qualitative (and part quantitative) appraisal of the strengths and weaknesses of each route corridor option. The factors and criteria were derived from relevant policy, including, but not limited to; National Policy Statement (NPS) EN-1 (**Ref. 3-2**), NPS EN-4 (**Ref. 3-3**), National Planning Policy Framework (NPPF) (**Ref. 3-4**), and Planning Policy Wales (**Ref. 3-5**).

3.4.19. The criteria were developed by the Project Team to ensure all relevant environmental, social, economic and engineering factors were considered in the appraisal. The route options were designed to consider:

- The requirement for and potential location of above ground installations at the beginning and end of each section of newbuild pipeline;
- Key environmental designations and constraints;
- Key planning designations and land use constraints (identified within local plans);
- Avoidance of potential engineering constraints (including complex infrastructure crossings);
- Avoidance of existing major utilities and centres of population;
- Compliance with relevant Health and Safety Executive (HSE) legislation; and
- Consider on-going accessibility and maintenance considerations.

Grinsome Road AGI to Alcohols Site AGI carbon dioxide pipeline

3.4.20. Three route options were identified for this section of newbuild pipeline and considered against the assessment criteria. Two route options, known as Southern Route Option A and Southern Route Option B, will be considered in more detail at Stage 3 and have informed this Scoping Report. Further detail on both route options is provided in **Section 3.5**.

Alcohols Site AGI to Flint AGI carbon dioxide pipeline

3.4.21. A number of potential route options were identified within the Core and Southern corridors and considered against the assessment criteria. There are several route options that will be considered in more detail at Stage 3 and have informed this Scoping Report. Further detail on the route options is provided in **Section 3.5**.

STAGE 3: REFINEMENT OF THE CARBON DIOXIDE PIPELINE ROUTE OPTIONS

3.4.22. Based on the conclusions of the Stage 2 Appraisal, Stage 3 will be undertaken to inform the next design phase. The Stage 3 Appraisal will consider feedback from non-statutory consultation process, engagement with land owners, engagement with statutory consultees, further design development, and environmental and technical surveys.

3.5. OPERATIONAL DESIGN

3.5.1. This section describes the main permanent features of the Proposed Development, as follows:

- Grinsome Road AGI to Alcohols Site AGI carbon dioxide pipeline – onshore pipeline (up to 20" in diameter) to transport CO_2 from the Grinsome Road AGI (located near Ince, Cheshire, England) to the Alcohols Site AGI (located within the Stanlow Refinery site east of Ellesmere Port, Cheshire, England);
- Alcohols Site AGI to Flint AGI carbon dioxide pipeline – onshore pipeline (up to 36" in diameter) to transport CO_2 from the Alcohols Site AGI to the Flint AGI (located on land north-west of Connah's Quay and south of Flint, Flintshire, Wales);
- Grinsome Road AGI (located near Ince, Cheshire, England);
- Alcohols Site AGI (located within the Stanlow Refinery Site east of Ellesmere Port, Cheshire, England);
- Flint AGI (located on land north-west of Connah's Quay and south of Flint, Flintshire, Wales);
- BVS located along;
  - the Flint-PoA pipeline; and
  - Alcohols Site AGI to Flint AGI carbon dioxide pipeline; and
- Other associated AGIs – this will include CP transformer rectifier cabinets.

3.5.2. Each of these components and their associated key features are set out in the following sections. All dimensions in the sections below are approximate and are subject to further design. The ES will set out and assess final dimensions and any necessary limits of deviation.

NEWBUILD ONSHORE PIPELINE TO TRANSPORT CARBON DIOXIDE

3.5.3. This section summarises the design of the newbuild onshore pipeline that will be designed to transport compressed carbon dioxide emissions. The newbuild onshore pipeline in conjunction with the repurposed Flint-PoA pipeline will have a capacity of approximately 4.5 Mtpa. However, the Alcohols Site AGI to Flint AGI carbon dioxide pipeline will be sized to accommodate future flows of up to approximately 10 Mtpa.

3.5.4. As set out above (and in **Chapter 2**), there are two sections of pipeline that have been developed for EIA Scoping:

1. **Grinsome Road AGI to Alcohols Site AGI carbon dioxide pipeline**: A section of onshore pipeline (up to 20” in diameter with capacity of up to approximately 2.5 Mtpa at a pressure of 39 barg) to connect into the Grinsome Road AGI and the Alcohols Site AGI; and
2. **Alcohols Site AGI to Flint AGI carbon dioxide pipeline**: A section of onshore pipeline (up to 36” in diameter with a capacity of up to approximately 10 Mtpa at a pressure of 35 barg) to connect into the Alcohols Site AGI and Flint AGI.

3.5.5. At this stage of the process, only indicative design information is available. However, route options have been defined for the newbuild pipeline as presented within the Newbuild Infrastructure Scoping Boundary.

3.5.6. As the design develops, the following key principles will be adhered to by the design team for both pipelines:

- A design life of 40 years;
- Protection against corrosion;
- Protection against loss of containment;
- Pressure sensors to allow continual remote monitoring;
- Telemetry to allow remote operation of valves; and
- Continual monitoring via a leak detection system.

3.5.7. A brief description and the characteristics of the route options under consideration for the newbuild pipeline is provided in Table 3-1. Both sections of the newbuild pipeline currently have multiple route options under consideration as part of the Proposed Development.

3.5.8. To aid the design development and EIA process, both sections of newbuild pipeline have been broken down into sub-sections, with alternatives, as follows:

- **Grinsome Road AGI to Alcohols Site AGI carbon dioxide pipeline**:
  - Section 1a: Grinsome Road AGI to Alcohols Site AGI (Southern Route Option A); and

- Section 1b: Grinsome Road AGI to Alcohols Site AGI (Southern Route Option B).

- **Alcohols Site AGI to Flint AGI carbon dioxide pipeline**:
  - Section 1: Alcohols Site AGI to Wervin;
  - Section 2a: Wervin to Pentre (Southern Option);
  - Section 2b: Wervin to Pentre (Alternative Southern Option);
  - Section 2c: Wervin to Pentre (Northern Option);
  - Section 3: Pentre to Connah's Quay Road;
  - Section 4a: Connah's Quay Road to Flint AGI (Northop Road);
  - Section 4b: Connah's Quay Road to Flint AGI (Little Leadbrook Farm); and
  - Section 4c: Connah's Quay Road to Flint AGI (Leadbrook Drive).

Table 3-1: Description of Route Options

Section No.	Section Name	Section Length	Relevant Figures	Route Description	Potential Trenchless Crossings
Grinsome Road AGI to Alcohols Site AGI carbon dioxide pipeline					
1a	Grinsome Road AGI to Alcohols Site AGI (Southern Route Option A)	5.5km	**Figure 3-2 (Appendix A)**	From the proposed location(s) of the Grinsome Road AGI, the route heads south of Elton before crossing the Ellesmere Port to Warrington railway line. The route would continue north of the M56 Chester Services (junction 14) before crossing the A5117 Chester Road and heading in a south-westerly direction south of Elton. The route continues west before heading in a north-westerly direction towards Thornton le Moors. The route would cross the B5132 Cryers Lane, before heading northwards to the Alcohols Site AGI located within the Stanlow Refinery site.	• Main road into CF Fertiliser Site • Ellesmere Port to Warrington railway line • B5132 Cryers Lane • A5117 Chester Road.
1b	Grinsome Road AGI to Alcohols Site AGI (Southern Route Option B)	5.5km	**Figure 3-2 (Appendix A)**	From the proposed location(s) of the Grinsome Road AGI, the route heads south of Elton before crossing the Ellesmere Port to Warrington railway line. The route would cross the M56 before heading in a south-westerly direction and crossing the A5117 Chester Road. The route would continue west before heading in a north-westerly direction towards Thornton le Moors. The route would cross the B5132 Cryers Lane, before heading northwards to the Alcohols Site AGI located within the Stanlow Refinery site.	• Main road into CF Fertiliser Site • Ellesmere Port to Warrington railway line • M56 • B5132 Cryers Lane • A5117 Chester Road
Alcohols Site AGI to Flint AGI carbon dioxide pipeline					
1	Alcohols Site AGI to Wervin	5km	**Figure 3-2 (Appendix A)**	From the Alcohols Site AGI, the route heads south, crossing the A5117 Chester Road before continuing on a southwards trajectory east of Thornton le Moors and the Gowy Meadows Nature Reserve. The route crosses the M56 before heading in a south-westerly direction crossing the River Gowy and North Cheshire Way (long distance footpath). The route crosses Picton lane before ending approximately 500m west of Wervin.	• A5117 Chester Road • M56 • Thornton Main Drain • River Gowy.
2a	Wervin to Pentre (Southern Option)	16km	**Figure 3-2 & Figure 3-3 (Appendix A)**	Heading south of Wervin, the route makes a sharp turn west crossing the M53. From the M53, the route runs broadly westwards through arable fields to the north of Chester, crossing the Shropshire Union Canal (canal path is also National Cycle Network (NCN) Route 5), the A41, and the wooded edges of Friars Park at which point the route reaches the Merseyrail Wirral Line before heading in a south-westerly direction, avoiding the settlement of Mollington, before crossing the A540 Parkgate Road. At this point, the route exits the Cheshire Plain and crosses the border into Wales. At the border between Wales and England, the route continues to head in a south-westerly direction and crosses the A548 Sealand Road, River Dee (Afon Dyfrdwy), and North Wales Coast Line before turning west. The route crosses the B5129 Chester Road East heading north-west towards the built-up sub-urban edge of Sandycroft, Mancot, and Queensferry. The route weaves through residential areas and crosses several minor roads before turning westwards and ending at Willow Park.	• M53 • Mervin Road • Shropshire Union Canal • Caughall Lane • A41 Liverpool Road • Merseyrail Wirrel Line • A540 Parkgate Road • Hermitage Road • A548 Sealand Road • River Dee (Afon Dyfrdwy) • North Wales Coast Line • Sandycroft Drain North/South • B5129 Chester Road East.
2b	Wervin to Pentre (Alternative Southern Option)	14km	**Figure 3-2 & Figure 3-3 (Appendix A)**	Heading south of Wervin, the route makes a sharp turn west crossing the M53. From the M53 the route runs broadly westwards through arable fields to the north of Chester, crossing the Shropshire Union Canal (canal path is also National Cycle Network (NCN)	• M53 • Mervin Road • Shropshire Union Canal

Section No.	Section Name	Section Length	Relevant Figures	Route Description	Potential Trenchless Crossings
				Route 5), the A41, and the wooded edges of Friars Park at which point the route reaches the Merseyrail Wirral Line before heading in a south-westerly direction, avoiding the settlement of Mollington, before crossing the A540 Parkgate Road. At this point, the route exits the Cheshire Plain and crosses the border into Wales. At the border between Wales and England, the corridor continues to head in a south-westerly direction. North of the A548 Sealand Road, the route heads west towards Sealand. The route weaves through pockets of residential areas located south of Garden City and the A494 Aston Road before crossing the River Dee (Afon Dyfrdwy). The route continues in a south-westerly direction through the riverside industrial areas of Queensferry before passing the Pentre Retail Park to cross the B5129 Chester Road. This section of the route ends at Willow Park.	• Caughall Lane • A41 Liverpool Road • Merseyrail Wirrel Line • A540 Parkgate Road • Hermitage Road • A548 Sealand Road • River Dee (Afon Dyfrdwy) • North Wales Coast Line • B5129 Chester Road East
2c	Wervin to Pentre (Northern Option)	14km	**Figure 3-2 & Figure 3-3 (Appendix A)**	Heading north of Wervin, the route heads west crossing the M53. From the M53 the route runs broadly westwards through arable fields crossing the Shropshire Union Canal (canal path is also National Cycle Network (NCN) Route 5), and A41 Liverpool Road north of Backford. The route contiinues westwards north of Lea-by-Backford before crossing the A540 Parkgate Road and heading in a south-westerly direction towards the England / Wales border. The route continues to head in a south-westerly direction and crosses the A548 Sealand Road. The route weaves through pockets of residential areas located south of Garden City and the A494 Aston Road before crossing the River Dee (Afon Dyfrdwy). The route continues in a south-westerly direction through the riverside industrial areas of Queensferry before passing the Pentre Retail Park to cross the B5129 Chester Road. This section of the route ends at Willow Park.	• M53 • Shropshire Union Canal • A5032 Whitby Road • A41 Liverpool Road • Merseyrail Wirrel Line • A540 Parkgate Road • A548 Sealand Road • River Dee (Afon Dyfrdwy) • North Wales Coast Line • B5129 Chester Road East
3	Pentre to Connah's Quay Road	8km	**Figure 3-3 & Figure 3-4 (Appendix A)**	Heading in a westerly direction, the route weaves through the residential areas of Mancot, Pentre, Ewloe and Ewloe Green, crossing the A550 Gladstone Way and A494 Aston Expressway, as well as several minor roads. The route crosses the B5125 Holywell Road before heading in a south-westerly directions towards the A55 North Wales Expressway. The route hen follows the path of the A55 North Wales Expressway on higher ground until (90-100 m AOD) before skirting around the south-western edge of Northop Hall. The route continues to head north crossing the B5125 Stamford Way before reaching Connah's Quay road where this section of the route ends.	• A550 Gladstone Way • Borderlands Line • A494 Aston Expressway • B5125 Holywell Road • Ancient Woodland (Northop Hall)
4a	Connah's Quay Road to Flint AGI (A)	2-3km	**Figure 3-4 (Appendix A)**	From Connah's Quay Road, the route heads northwards, running east of Leadbrook Wood. The route continues in a north-westerly direction crossing Allt-Goch Lane and the Flint Mountain (Mynydd y FFlint) Site of Special Scientific Interest (SSSI). This option would end approximately 400m south of Flint High School (Ysgol Maes Hyfryd).	• Starkey Lane • Allt-Goch Lane • Flint Mountain (Mynydd y FFlint) SSSI

Section No.	Section Name	Section Length	Relevant Figures	Route Description	Potential Trenchless Crossings
4b	Connah's Quay Road to Flint AGI (B)	2-3km	**Figure 3-4 (Appendix A)**	From Connah's Quay Road, the route heads northwards, running east of Leadbrook Wood. The route continues northwards, running parallel with Allt-Goch Lane, before ending approximately 300m west of Little Leadbrook Farm.	• Starkey Lane
4c	Connah's Quay Road to Flint AGI (C)	2-3km	**Figure 3-4 (Appendix A)**	From Connah's Quay Road, the route heads northwards, running east of Leadbrook Wood. The route continues in a north-easterly direction across agricultural land before re-directing northwards, parallel with Leadbrook Drive. The route would end approximately 200m west of Leadbrook Hall Farm.	• Starkey Lane

ABOVE GROUND INSTALLATIONS (AGI) AND OTHER PERMANENT INFRASTRUCTURE

3.5.8. This section summarises the design of new permanent above ground installations (AGIs) and minor above ground infrastructure that will be constructed as part of the Proposed Development. AGIs are securely fenced compounds of varying sizes which form an essential part of the buried pipeline system.

3.5.9. At this stage of design development, only indicative design information is available. This will be updated during the EIA process.

Grinsome Road AGI

General Characteristics

3.5.10. The approximate location of the Grinsome Road AGI compound is shown on **Figure 3-2 (Appendix A)**. The AGI will be located adjacent to the CF Fertiliser Plant; however, the exact location of the AGI is yet to be confirmed.

3.5.11. The proposed Grinsome Road AGI compound, measuring approximately 64m x 34m, will be designed to accommodate the following provisions:

- Pipeline Inspection Gauge (PIG) launcher facilities for the proposed Grinsome Road AGI to Alcohols Site AGI carbon dioxide pipeline;
- Carbon dioxide vent facilities (including provision for a temporary vent stack);
- Provision for a connection flange to a proposed pipeline connecting into the Protos Site (including the Biomass Power Plant), a separate pipeline connecting into the CF Fertiliser Plant, and provision for future local emitters;
- Associated infrastructure (including valves, control mechanisms, lighting, parking provisions, access arrangements, and instrumentation).

3.5.12. An indicative layout design for the Grinsome Road AGI compound is shown on **Figure 3-15 (Appendix A)**.

Site Description

3.5.13. The proposed AGI site will be situated within the Ince Parish Council boundary. There are two sites currently under consideration that are located close to the CF Fertiliser Plant. One site is located approximately 350m east of the Protos Biomass Power Plant, and approximately 450m west of the Frodsham Wind Farm. The second site is located 100m south-west of the Protos Biomass Power Plant.

3.5.14. The Mersey Estuary Ramsar / Special Protection Area (SPA) / SSSI is located approximately 800m north of the site. The AGI site itself is allocated as Coastal and Floodplain Grazing Marsh, which is a Habitat of Principal Importance.

3.5.15. The site is located within Flood Zone 3 and is therefore susceptible to regular flood events (terrestrial and marine). Peckmill Brook, Hoolpool Gutter at Ince Marshes river (a Water Framework Directive waterbody) is located approximately 250m east of the site.

3.5.16. A small plantation is located immediately north-west of the proposed AGI site. This area of woodland is compensatory planting associated with the Protos Biomass Power Plant.

Alcohols Site AGI

General Characteristics

3.5.17. The approximate location of the proposed Alcohols Site AGI compound is shown on **Figure 3-2 (Appendix A)**. The AGI will be located within the Stanlow Refinery site, the exact location and measurements of the AGI are yet to be confirmed. The proposed Alcohols Site AGI compound will be designed to accommodate the following provisions:

- PIG receiver facilities for a proposed pipeline from the Grinsome Road AGI;
- PIG launch facilities for a proposed pipeline from the Alcohols Site AGI to Flint AGI (near Connah's Quay);
- Connections to other emitters including proposed Hydrogen Plants;
- Carbon dioxide vent facilities (including provision for a temporary vent stack); and
- Associated infrastructure (including valves, control mechanisms, lighting, parking provisions, access arrangements, and instrumentation).

Site Description

3.5.18. The proposed AGI site is situated within the Elton Parish Council boundary. The site is located within the boundary of the existing Stanlow Refinery Site, a 770ha industrialised area of Ellesmere Port. The refinery site has a strategic role in the UK economy, supplying 16% of all road transport fuels. In addition, it is a major regional employer with over 900 staff and an additional 800 on-site contractors (**Ref. 3-6**).

3.5.19. The closest settlement to the proposed AGI site is Thornton-le-Moors, located approximately 500m to the south-west. Thornton-le-Moors is home to a number of listed buildings, including the Grade I listed Church of St Mary. The 'Moated site, fishpond and connecting channel, Elton' Scheduled Monument is also located 850m south-east of the site.

Flint AGI

3.5.20. As described in Table 3-1, there are currently three route corridors under consideration for the Alcohols Site AGI to Flint AGI carbon dioxide pipeline from Connah's Quay Road to the final location of the Flint AGI. Therefore, there are currently three potential locations for the proposed Flint AGI compound under consideration; east of Northop Road, west of Little Leadbrook Farm, and west of Leadbrook Hall Farm. The approximate locations of the proposed Flint AGI compound are shown on **Figure 3-5 (Appendix A)**.

3.5.21. The Flint AGI compound will act as the tie-in point to the existing natural gas pipeline near Connah's Quay, which is being repurposed as part of the Project (see Section 2.2.5). The proposed Flint AGI compound, measuring approximately 99m x 72m, will be designed to accommodate the following provisions:

- PIG receiver facilities for the Alcohols Site AGI to Flint AGI carbon dioxide pipeline;
- PIG launch facilities for the existing natural gas pipeline to Point of Ayr;
- Carbon dioxide vent facilities (including provision for a temporary vent stack); and
- Associated infrastructure (including valves, control mechanisms, lighting, parking provisions, access arrangements, and instrumentation).

3.5.22. An indicative layout design for the proposed Flint AGI compound is shown on **Figure 3-16 (Appendix A)**.

Site Description

3.5.23. The proposed AGI site will be located within the Flint Community Council boundary, between the settlements of Flint (Y Fflint), Oakenholt, and Flint Mountain (Mynydd y Fflint).

3.5.24. All three of the proposed AGI sites are located within 1km south of the Dee Estuary Ramsar / SPA / SAC / SSSI site and Flint Mountain SSSI.

3.5.25. The Bryn y Cwm Mound & Bailey Castle scheduled monument is located approximately 300m west of the proposed AGI site east of Northop Road. Leadbrook Hall, a Grade II listed building, is located approximately 200m south-east of the proposed AGI site west of Leadbrook Hall Farm.

3.5.26. There is a public footpath (Code: 404/66/20) which passes through the proposed AGI site west of Little Leadbrook Farm and a separate public footpath (Code: 404/66/10) that passes through the proposed AGI site west of Little Leadbrook Farm.

Block Valve Stations (BVS)

3.5.27. Block valves are used to isolate sections of pipeline for maintenance purposes or in case of emergency. Leak detection systems installed along the pipeline will identify if a leak has occurred at what location. The appropriate block valves would then be closed to isolate that section of pipeline.

3.5.28. It is anticipated that each BVS station will be located within a fenced enclosure (approximately 35m x 25m). The fencing will be approximated 3m high and will incorporate a vehicular access gate. The block valves will be installed below ground level in accessible chambers, with only limited above ground visible elements including secure chamber access covers and a containerised electrical and instrumentation kiosk. The BVS may also include provisions for future pipeline connections.

3.5.29. The BVS will be powered by connections to existing electrical and telecoms utilities. The connection works would be progressed by the respective statutory undertaker and is therefore is not included as part of the Proposed Development.

3.5.30. The BVS would include a foundation pad and connection point for a mobile temporary vent stack which would be brought to the BVS and installed if a section of the pipeline needed to be depressurised (for shutdown and maintenance purposes).

3.5.31. A typical block valve station compound is shown in **Figure 3-19 (Appendix A)**.

New sections of pipeline

3.5.32. The size, number, and location of the BVS required for the Alcohols Site AGI to Flint AGI carbon dioxide pipeline is still to be determined.

3.5.33. As part of the iterative design process, further work will be undertaken to ensure information on the BVS along the Alcohols Site AGI to Flint AGI carbon dioxide pipeline is included as part of the PEIR (to inform the Statutory Consultation). The Applicant will agree the scope of any additional EIA works for the BVS with statutory consultees through Statements of Common Ground (SoCG).

Existing natural gas Connah's Quay to Point of Ayr pipeline

3.5.34. It is anticipated that up to four block valves will be required along the existing natural gas Connah's Quay to Point of Ayr pipeline.

3.5.35. The indicative locations of the BVS are shown on **Figures 3-5 and 3-6** and a brief description of the location surroundings and key environmental constraints is outlined in Table 3-2.

Table 3-2: Location and Surroundings of Proposed BVS

Block Valve Reference	Approximate Location	Description of location and surroundings
Coed-y-Cra	SJ225719	• Located within the Parish of Flint • Rural location. Nearest settlement is the town of Flint located approximately 1km east.
Cornist Lane	SJ216725	• Located within the Parish of Flint • Rural location. Nearest settlement is the town of Flint located approximately 1.5km east. • There are two Scheduled Monuments within 1km, the closest being 'Hafod Wood Moated Site' located 600m south west • There is one Listed Building within 1km, which is Grade II Listed 'Hafod Farmhouse' located 850m south west.
Pentre Halkyn	SJ173732	• Located in the Parish of Brynford, near the boundary with Ysceifiog • Rural location. Nearest settlement is the town of Pentre Halkyn, located approximately 1.3km west. • Located 400m from the Halkyn Mountain SAC and Halkyn Common and Holywell Grasslands SSSI • There are four Scheduled Monuments within 1km, the closest being 'Bryn y Cosyn Round Barrows', located 200m south • There are four Listed Buildings within 1km, the closest of which is the Grade II* Listed 'Llwyn-erddyn', located 500m south west.
Babell	SJ149745	• Located within the Parish of Ysceifiog. • Rural location, but nearby the settlement of Pant. • Located 900m from The Halkyn Common and Holywell Grasslands SSSI / Halkyn Mountain SAC. • There are five Scheduled Monuments within 1km, the closest being 'Enclosure, Field System & Hollow-ways North of Pant', located 500m west. • There are five Listed Buildings within 1km, the closest of which is 'Plas-newydd', located approximately 250m east.

Other Above Ground Installations

Cathodic Protection (CP) transformer rectifier cabinets

3.5.36. The CP system would protect the newbuild onshore pipelines. Most elements of the CP system including cabling and ground beds are buried below ground and not visible. However, above ground CP transformer rectifier cabinets would need to be installed along the length of the pipeline as well as CP test points at major crossing points. The CP transformer rectifier cabinets would be powered by connections to electrical and telecoms utilities.

3.5.37. Further detail on the number and location of CP transformer rectifier cabinets, as well as any associated electrical and telecommunications infrastructure, will be provided as part of the PEIR and, ultimately, the ES.

3.6. CONSTRUCTION DESIGN

3.6.1. This section summarises the key construction activities of the Proposed Development. In addition, it provides detail on the temporary above ground infrastructure that will need to be provided for the installation of the pipeline, AGIs and associated permanent infrastructure, as developed for Scoping.

3.6.2. This section includes information on:

- Pipeline construction techniques and sequencing;
- AGI installation sequencing;
- Pre-commissioning activities;
- Construction site compounds and site access routes; and
- An indicative Construction Programme.

PIPELINE CONSTRUCTION TECHNIQUES AND SEQUENCING

Overview

3.6.3. The pipeline will be buried underground for its entire length. The minimum depth from the top of the pipe to the ground surface will be in accordance with relevant standards but is typically 1.2m in open cut sections. For trenchless crossings of railway lines and specified roads, rivers and other major infrastructure, the depth would be greater to avoid existing services and physical obstructions and to take account of the higher ground loading.

3.6.4. It is expected that the pipeline will be constructed in the same way as a natural gas transmission pipeline, involving excavation of an open trench, lowering of the pipe into the trench and backfilling with the excavated material. The ground will be reinstated after construction, allowing normal agricultural use to resume, and hedges, fences and other features will be replanted and replaced.

3.6.5. Alternative construction techniques, such as Horizontal Direct Drilling (HDD) and tunnelling, may be used where appropriate considering engineering constraints and environmental effects.

3.6.6. Construction works will generally be contained within a fenced working area, termed the working width, approximately 28m wide. A narrower working width may be required at specific locations to mitigate ecological impacts or to avoid sensitive structures, such as high voltage electricity transmission towers. In addition, a wider working width may be required to facilitate the construction of the pipeline across certain road, watercourse and service crossings and where specific installation approaches are proposed. This is to provide storage for excavated material from drill pits, off-road temporary parking space, access requirements and equipment such as that needed for the construction of crossings.

3.6.7. The temporary dewatering of the pipe trench and other areas of excavation may be required in some areas to stabilise the surrounding ground during construction. This activity would be subject to a separate consent which would be granted by the Environment Agency / Natural Resources Wales (NRW) and would be applied for in advance of the construction works.

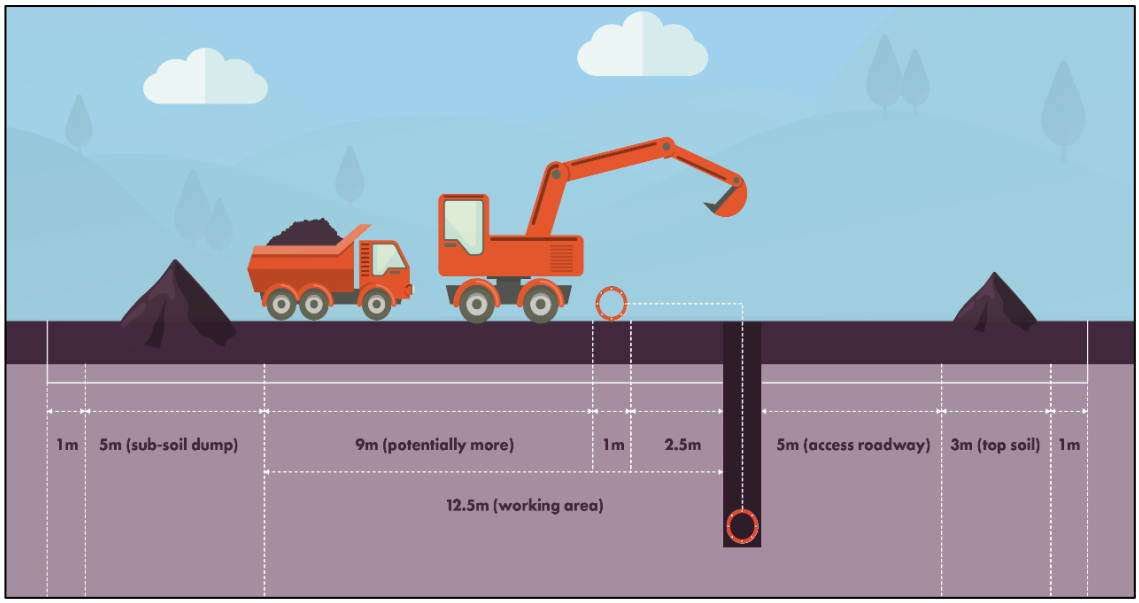
Pipeline Construction Sequencing in Rural Areas

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

- Clearing and fencing of the pipeline working width;
- Removal of topsoil, which is stored separately to subsoil, on one side of the trench;
- Receiving materials;
- Laying out (‘stringing’) of pipe sections adjacent to the trench line, field bending as required, followed by welding and inspections of the pipe sections;
- Field joint coating application;
- Excavation of a narrow trench, to provide a depth of cover, typically 1.2m, but and deeper at crossings;
- Lifting and lowering of the pipe into the trench;
- Backfilling of the trench;
- Replacement of topsoil which is levelled and reinstated to the original state;
- Reinstatement of existing drainage features;
- Removal of temporary fencing; and
- Planting of hedges and installation of new fencing.

3.6.9. A typical pipeline construction working width layout is illustrated in **Figure 3-20**.

Figure 3-20: Typical Cross-Section of Construction Working Width



Pipeline construction in urban Areas

3.6.10. The construction of pipeline in built up urban areas would follow a similar sequence to that for rural areas, although as a result of the increased number of constraints, the construction process would be more complex. The key differences to the approach may include:

- Increased need for implementation of road closures, diversions and traffic management measures;
- More constrained working widths associated with increased obstructions and other constraints (i.e. services and utilities);
- A greater need for the breaking out of road and other hard surfaces when excavating the pipeline trench;
- Increased likelihood that material excavated from the pipeline trench will require off-site disposal with suitable imported material having to be used for backfilling of the trench;
- Shorter pipe lengths resulting in more pipe welds; and
- Increased need for reinstatement of road surfaces, footpaths and landscaped areas.

Pre-Construction Activities

3.6.11. Pre-construction activities will include the following:

- Ecological pre-construction work;
- Archaeological pre-construction work;
- Topographical surveys;
- Utilities searches and drainage surveys;

- Geotechnical and ground stability surveys; and
- Site investigations such as pre-construction contamination surveys.

3.6.12. Ahead of construction, the pipeline route will be surveyed and pegged out in consultation with the landowner/occupier. Where appropriate, pre-construction field drainage will be installed within the working width to:

- Help prevent possible waterlogging of the working width and therefore the need for temporary dewatering during construction;
- Enable existing drainage systems to continue working throughout the period of pipeline construction;
- Help prevent damage to the soil structure;
- Aid recovery from construction activities; and
- Help prevent any future drainage problems.

Main Works

3.6.13. The temporary working width will be clearly fenced. The type of temporary fencing will be agreed with the landowner/occupier and special arrangements, such as stock proof fencing or horse fencing, will be made following consultation. Where necessary, access points will be provided to allow landowners/occupiers passage across the pipeline working width. The working width will then be cleared of vegetation. Wherever possible, established trees will be fenced off and worked around.

3.6.14. The construction of any haul roads will vary along the pipeline route length depending on the local ground conditions and time of year. Much of the pipeline route is across agricultural land and in summer months there may be cases where there is no requirement to import aggregates as the ground will be stable. In other areas (or during periods of adverse weather) there may be the requirement to import aggregates to create a stable surface for construction traffic movements.

3.6.15. The pipe trench will be dug either with mechanical excavators straddling or running alongside the pipeline trench or using a specialised trenching machine. The depth will be variable but will allow a minimum reinstated cove, typically 1.2m, above the pipeline in agricultural land. Where necessary, to aid construction and in order to maintain the integrity of the excavated trench, trench supports, and close sheet piling may be used. Dewatering of the pipe trench and excavation may be required in some areas to stabilise the surrounding ground during construction. Where necessary, additional drainage for site compounds, mobilisation areas, and accesses would be installed.

3.6.16. The pipe will be transported from temporary storage areas along the working width and laid adjacent to the trench line; this activity is termed ‘stringing’. Following stringing, the pipeline sections will be welded together above ground

into pipe strings. All the welds will be tested and certified in situ before an approved coating is applied on-site to protect the welds from corrosion. All welds will be subject to non-destructive testing.

3.6.17. Following trench excavation each welded pipe section will be carefully lowered into the trench using side boom tractors or equivalent plant. Care will be taken to ensure that the pipe string and its protective coating are not damaged during this process. To prevent damage to the coating only granular fill will be used to surround the pipe itself. The pipe trench will then be backfilled with the material taken from the trench in the reverse order to which it was excavated. The backfilled materials will be consolidated by tamping or rolling. Pre-construction surveys will be undertaken to identify where water stops (e.g. clay plugs) will need to be installed in the trench to prevent it acting as a conduit for groundwater.

3.6.18. Any surplus material from trench excavation may be spread and compacted across the working width before the topsoil is reinstated on a field-by-field basis, provided this will not impede achievement of restoration objectives, the materials are compatible, and the landowner is in agreement. The landowner/occupier will also be consulted before any off-site disposal is planned. In such instances, disposal will be undertaken in accordance with the Waste Management Regulations.

Reinstatement

3.6.19. The ground will be reinstated with the stored topsoil and subsoil following trenching. If necessary, the subsoil will be ripped prior to topsoil placement if compaction has occurred. Topsoil will be spread in such a way as to ensure that it does not become compacted. All surplus construction materials will be removed on completion of the work.

3.6.20. Following reinstatement of soil and subsoil, final restoration of the pipeline working width will commence. Restoration activities will include, reseeding of pasture land, reinstatement of field boundaries e.g. permanent fences and suitable hedgerow species replanted.

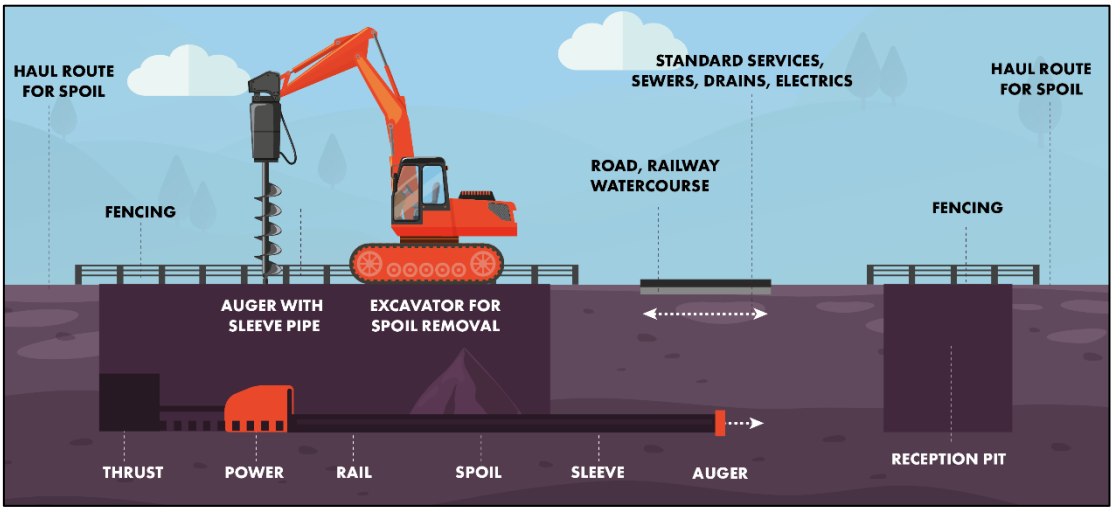
3.6.21. The pipeline route will be marked with marker posts at field boundaries. These will be visible from the ground and all marker posts will be located to minimise interference with agricultural activities.

Special Crossings

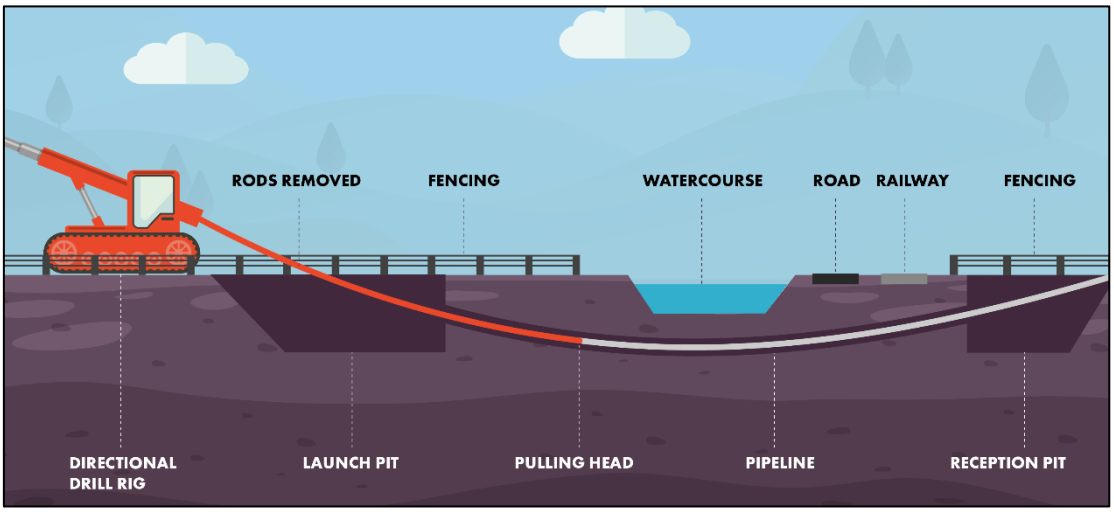
3.6.22. The crossings of trunk roads, motorways and railways will be crossed using trenchless techniques, such as auger bore, HDD or micro-tunnelling. A number of other roads could also be crossed using trenchless techniques, although the details have yet to be confirmed. The ES will identify locations where trenchless crossing techniques are expected to be used.

3.6.23. Indicative drawings of trenchless crossing techniques (auger bore, HDD, and micro-tunnelling) are shown in **Figure 3-21**.

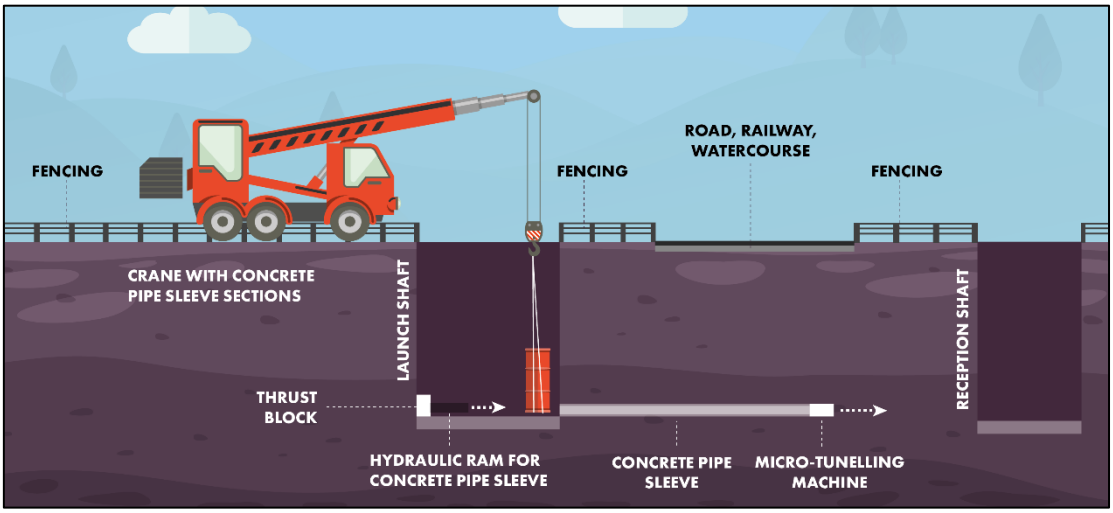
Figure 3-21: Typical trenchless crossing techniques



Auger Bore



Horizontal Directional Drilling



Micro-tunnelling

3.6.24. These technologies can install a pipeline underneath major obstructions without disturbance or interruption to the feature being crossed. Other roads would typically be open cut. Roads being crossed using open cut techniques would need to be partially or completely closed during construction of the crossing, with appropriate traffic management measures and temporary diversions being put in place for the duration of the works.

3.6.25. Crossings of minor watercourses including rivers, streams and ditches would typically be open cut, although crossings of major watercourses such as the River Dee (Afon Dyfrdwy) would require trenchless techniques. As part of the design development process, individual crossing locations would be assessed as being appropriate for open cut or trenchless crossings. This process would carry on throughout the EIA process and be presented in the ES to be submitted with the Application.

AGI INSTALLATION

3.6.26. Construction of the AGI sites (including BVS) is anticipated to involve the following sequence of activities:

- Site preparation;
- Construction of an access road if required, or upgrade of an existing track if possible;
- Installation of underground works and foundations;
- Installation of above ground structures;
- Installation of pipeline, mechanical instrumentation and electrical equipment;
- Connections to utility services; and
- Construction fencing and other landscaping as required.

PRE-COMMISSIONING

3.6.27. Following pipeline installation, pre-commissioning activities will include cleaning and gauging, hydrostatic testing, dewatering and drying. The pipeline will be caliper and intelligent PIG inspected to fingerprint its integrity.

3.6.28. Hydrostatic testing involves filling the pipeline with water which is then pressurised to test the line for leaks. This water is then discharged or pumped into the next section. Samples of the hydrostatic test water will be taken prior to and after use.

CONSTRUCTION SITE COMPOUNDS AND SITE ACCESS ROUTES

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

3.6.30. The temporary compounds would include hardstanding areas, with apron and haul road areas comprising stone laid on a geotextile membrane. Sizes would vary but would have a fenced area (approximately 47m x 47m for a typical rural construction compound).

3.6.31. The construction compounds may require lighting to ensure safety and security, especially in the winter months.

3.6.32. An indicative layout design for a typical rural construction compound is shown on **Figure 3-22**.

3.6.33. Temporary access tracks would be provided to link the pipeline construction areas to the local road network. Where required, temporary access tracks would be constructed of stone laid on a geotextile membrane. The access tracks would be fenced and gated to aid control of vehicle access to and exit from the construction areas from the local road network.

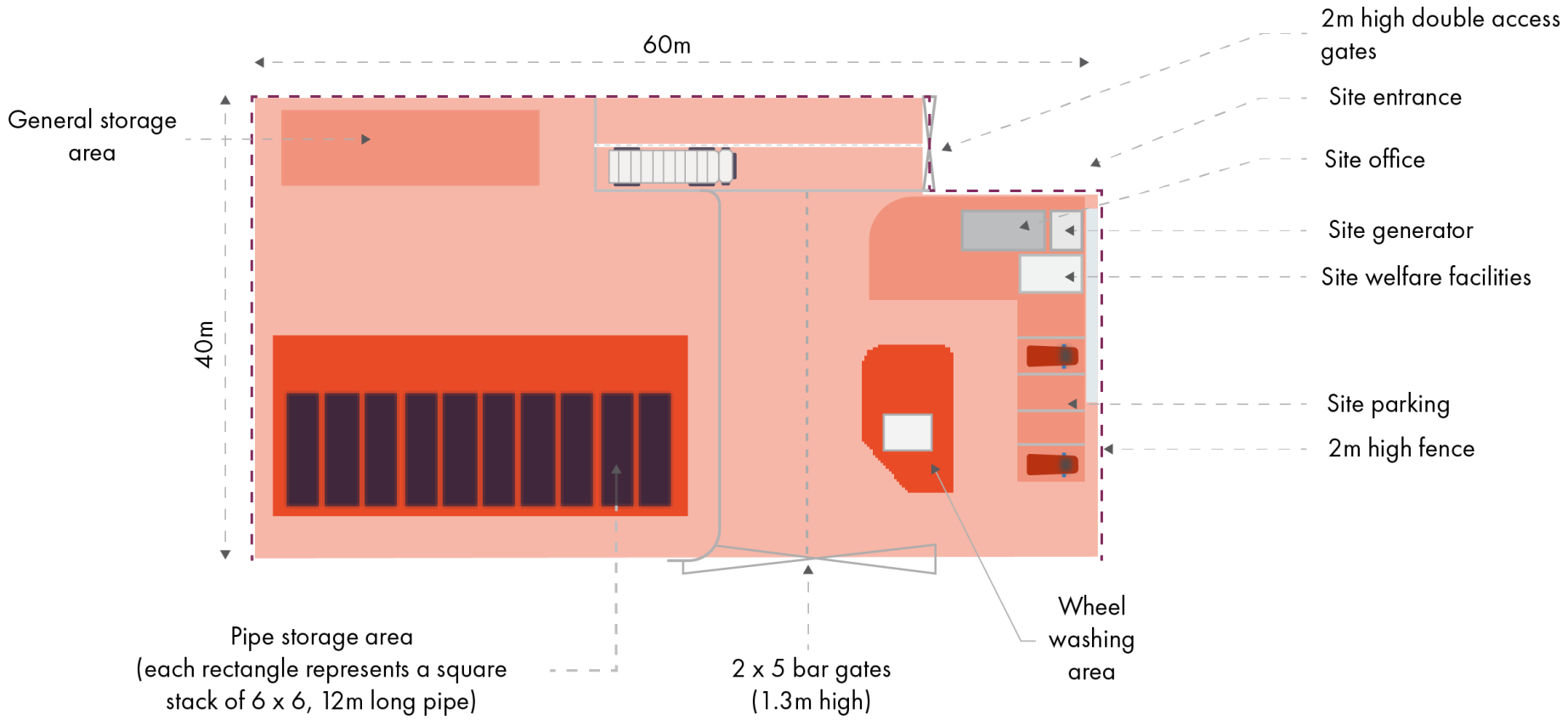
3.6.34. Further work will be undertaken to identify the land that is likely to be required for the temporary construction compounds (including laydown/storage areas), and access/haul routes connecting to the pipeline corridor from nearby highways.

CONSTRUCTION PROGRAMME

3.6.35. The overall construction period for the Proposed Development from the commencement of the construction works to completion of commissioning is anticipated to be approximately 18 months.

3.6.36. To reduce the length of the construction programme, the construction process would be programmed as a series of concurrent work packages along the length of the pipeline.

Figure 3-22: Typical Rural Construction Compound



3.7. OPERATION AND MAINTENANCE

PROCEDURE

3.7.1. The new pipeline will be designed in accordance with relevant industry codes of practice, standards and recommended practice and the requirements of the Pipeline Safety Regulations 1996. The pipeline will be operated in accordance with an Operations and Maintenance Procedure. Integrity and operation of the Proposed Development will be monitored continuously from a central control room.

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

LEASE / EASEMENT

3.7.3. Once built, the pipeline will be protected by leases and/or easements. The width of the lease / easement will vary depending on the location but will not exceed 25m. This will prevent construction or earthworks within the easement and allow access to the pipeline for routine and emergency maintenance.

PROTECTION

3.7.4. A CP system will be used to protect the pipeline against corrosion. The CP system is buried underground with the exception of associated CP transformer rectifier cabinets, each of which would be located within an above ground cabinet.

INSPECTION

3.7.5. Once the Proposed Development is operational, a programme of inspection and maintenance, in accordance with best practice and regulatory requirements, would typically include:

- Vantage point surveys including pipeline easement (typically weekly);
- Aerial surveys using helicopters (typically bi-weekly);
- Line walk along the land pipeline system (typically annually);
- Testing of CP systems:
  - Condition of transformer rectifier cabinet and measurement of current at CP test points) (typically every month);
  - Electrical equipment, safety and protection devices, and status checks (typically every six months); and
  - Coating defect survey (every four years); and
- A programme of cleaning and inspection using PIG (every five years).

3.7.6. Where issues are found, these would be corrected by appropriate remedial works.

VENTING

3.7.7. Although there would be provision for temporary vent stacks to be installed at AGIs and BVS, there would be no routine venting from any part of the Proposed Development.

3.7.8. Venting of the CO_2 stream could take place in the following circumstances:

- Depressurisation of a pipeline section to allow maintenance, such as replacement of a section of pipeline. This is not expected within the lifetime of the Proposed Development;
- During Pigging operations where a small volume (several m^3) would be released. A pigging programme would involve several small venting activities lasting one or two weeks. This is expected at a frequency of around once every five years; and
- BVS leakage tests as required.

3.7.9. Pipeline operating procedures will include venting operations to ensure the activities are controlled and associated hazards are managed. This would include control measures to prevent the creation of an asphyxiating atmosphere.

3.7.10. As the specification for the pipeline will allow for the presence of hydrogen sulphide (H_2S) in the CO_2 stream, there is the potential for odour during venting operations. However, due to the highly infrequent nature of venting and application of pipeline operating procedures to control emissions, this issue is not considered further in this ES.

3.8. DECOMMISSIONING

3.8.1. When it reaches the end of its useful life, the pipeline will be decommissioned safely, with due regard to the environment. It is likely that the pipeline would be left in situ. When no longer required the AGIs are likely to be dismantled, with due regard to the environment.

3.8.2. Decommissioning would consider all the environmental legislation and the technology available at the time. Any necessary licences or permits would be acquired.

3.9. REFERENCES

- **Ref. 3-1**: https://www.nationalgrid.com/uk/electricity-transmission/document/96531/download [*Accessed: April 2021*]
- **Ref. 3-2**: Overarching National Policy Statement for Energy (EN-1), Department for Climate Change, July 2011
- **Ref. 3-3**: National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4), Department for Climate Change, July 2011
- **Ref. 3-4**: National Planning Policy Framework, Ministry of Housing, Communities & Local Government, February 2019
- **Ref. 3-5**: Planning Policy Wales [Edition 11], Welsh Government, February 2021
- **Ref 3-6**: http://www.essaroil.co.uk/our-work/stanlow/ [Accessed: April 2021]

4. EIA METHODOLOGY

4.1. INTRODUCTION

4.1.1. This chapter sets out the overall approach to the EIA for the Proposed Development. A detailed overview of the methodology adopted for each environmental topic is provided within the respective chapters of this report. The approach to the assessment has been informed by current best practice guidance, as set out within PINS Advice Note Seven.

4.1.2. The ES will contain the information specified in Regulation 14(2)(a)-(f) and Schedule 4 of the EIA Regulations 2017. In line with Regulation 14(4)(a) of the EIA Regulations 2017, the EIA will be undertaken by a suitably qualified project team and the qualifications and experience of the team will be set out in the ES. The Institute of Environmental Management & Assessment (IEMA) has awarded WSP the EIA Quality Mark in recognition of our commitment to excellence in EIA activities. We have continued to maintain this following annual examination in relation to our products, staff, innovation and promotion of EIA within the industry.

4.2. CONSULTATION

4.2.1. As part of the EIA, consultation will be undertaken with a range of statutory and non-statutory consultees. It is anticipated at this stage that consultees will include:

- Cheshire West and Chester Council (CWCC);
- Flintshire County Council (FCC);
- Chester County Council (CCC);
- Welsh Government (WG);
- Natural England (NE);
- Natural Resources Wales (NRW);
- Environment Agency (EA);
- Historic England;
- Cadw;
- Highways England;
- North and Mid-Wales Trunk Road Agency (NMWTRA);
- Public Health England (PHE);
- Public Health Wales (PHW);
- Canal and River Trust;
- Sustrans;

- Ramblers Society;
- The Coal Authority;
- RSPB;
- Cheshire Wildlife Trust (CWT);
- North Wales Wildlife Trust (NWWT); and
- Clwydian Range and Dee Valley AONB.

4.2.2. The purpose of this consultation will be to brief consultees on the Proposed Development, seek feedback on the approach to assessment, and obtain baseline data. The Public Participation Directive 2003/35/EC, as part of the EIA Regulations, provides opportunities for the public to be involved in the consenting process for certain activities, through access to information, justice and consultation on key documents.

4.2.3. Non-statutory consultation is expected to take place in June 2021 and statutory consultation in Q1 2022. The latter consultation will be supported by a PEIR which will be developed to help consultees take an informed view of the likely significant environmental effects of the Proposed Development.

4.2.4. Technical and procedural consultation will continue throughout the EIA process. A summary of consultation will be included within the ES and technical consultation will be summarised within the individual technical chapters. The Applicant will aim to agree Statements of Common Ground with key stakeholders to set out matters that have been agreed during consultation.

4.3. DEFINING THE STUDY AREA

4.3.1. The Study Area for each environmental topic is set out within the respective chapters of this report (see **Chapters 5-16**).

4.4. ESTABLISHING BASELINE CONDITIONS

4.4.1. Likely significant environmental effects will be described in the ES in relation to the extent of changes to the existing baseline environment as a result of the construction and/or operation of the Proposed Development. The baseline environment includes the existing environmental characteristics and conditions, based on surveys undertaken and information available at the time of the assessment.

4.4.2. Baseline conditions will be established by:

- Site visits and surveys;
- Desk based studies; and
- Modelling.

4.4.3. The baseline conditions for each environmental factor are set out within the respective chapters of this report (see **Chapters 5-16**). Environmental constraint plans which capture national and local environmental designations within 2km of the Newbuild Infrastructure Scoping Boundary are presented in **Figures 3-9 to 3-12**. Further detail on local designations will be confirmed with CWCC and FCC during the assessment.

4.4.4. The baseline conditions used in the ES will vary depending of the timing of surveys or the date at which data sources have been produced/assessed. It is anticipated that information required to inform the baseline environment for the assessments will be based on data obtained or surveys completed between Q4 2020 and Q2 2021. Where appropriate, existing baseline data collected prior to this may be used to inform the assessment if it is deemed to remain relevant.

4.4.5. Data obtained from third party sources may be older, but the origin of all third-party data will be clearly outlined, alongside any limitations and assumptions.

4.4.6. Baseline data which is deemed to be confidential in nature, such as that relating to protected species, will be provided in separate confidential appendices to the ES, due to the sensitivity of such species records.

LIMITATIONS

4.4.7. The period of validity for each set of baseline data collected will be set out in the ES and, where appropriate, the requirement for any repeat surveys will be specified, such as for species data.

4.4.8. In order to collect baseline data, it may be necessary to collect data on site. Where it is not possible to access private land, data will be collected from publicly accessible land only.

4.4.9. The COVID-19 pandemic has affected the everyday lives of the UK population in terms of travel, working arrangements and behaviour. Legal restrictions have been put in place by the UK Government and Welsh Government which, as a result, have impacted on normal baseline levels (e.g. typical traffic flows).

4.4.10. The approach to data collection in light of any COVID-19 restrictions will be confirmed and set out in the ES.

4.5. ESTABLISHING FUTURE BASELINE CONDITIONS

4.5.1. The ES will include an outline of the likely evolution of the existing baseline without implementation of the Proposed Development based on available information and knowledge. This information will be set out in the description of the Proposed Development chapter of the ES. The future baseline scenario will be clearly set out and described within the ES.

4.6. CONSIDERATION OF ALTERNATIVES

4.6.1. Regulation 14(2)(d) of the EIA Regulations 2017 states that an ES should include:

'a description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment'.

4.6.2. As part of the iterative design process, the Proposed Development will continue to evolve to take account of issues including environmental, health and safety and engineering constraints and opportunities. This will be recorded within the PEIR and ES as primary mitigation (see Section 4.7 below).

4.6.3. The assessment of alternatives in the PEIR and ES will report the key alternative corridors, route options and infrastructure locations / designs. It will also consider the construction strategy and best available techniques (BAT). The ES will consider the 'do nothing' scenario, i.e. the missed opportunities or avoidance of likely significant environmental effects associated with the Proposed Development.

4.6.4. The main reasons for selecting the chosen options will be provided, including a comparison of environmental effects.

4.7. APPROACH TO MITIGATION

4.7.1. The Institute of Environmental Management and Assessment (IEMA) issued 'Shaping Quality Development' in November 2015 and 'Delivering Quality Development' in July 2016. In accordance with these guidance documents, three types of mitigation will be identified and used within the ES:

- Primary mitigation – modifications to the location or design made during the pre-application phase that are an inherent part of the Proposed Development. These measures are treated as an inherent part of the Proposed Development;
- Secondary mitigation – actions that will require further activity in order to achieve the anticipated outcome. The effectiveness of such measures will be assessed within the ES and appropriate mitigation will be secured by the DCO or other suitable mechanism; and
- Tertiary mitigation – actions that would occur with or without input from the EIA. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are standard practices used to manage commonly occurring environmental effects. These measures are treated as an inherent part of the Proposed Development.

4.7.2. The primary and tertiary mitigation will be presented in the Proposed Development description in the ES and within the individual ES chapter for each environmental topic. The assessment of the likely significant environmental effects for the pre-mitigation scenario will take such mitigation into account in determining the magnitude of change.

4.7.3. Following assessment of the likely significant effects of the Proposed Development, any further mitigation measures (secondary mitigation) will be outlined within the individual ES chapter. These mitigation measures will further reduce a negative effect or enhance a positive one.

4.7.4. The mitigation will be recorded in a summary chapter of the ES. In addition, a Register of Commitments will also document all mitigation to ensure suitable identification and monitoring of mitigation beyond the submission of the DCO. This will include mitigation presented in this EIA Scoping Report that is relied on to scope out issues from subsequent stages of the EIA. The delivery of these mitigation measures will be secured through requirements in the draft DCO and other suitable mechanisms, as appropriate.

4.7.5. Protective provisions are a further mechanism by which mitigation measures to protect the interests of utility owners will be secured. Relevant protective provisions will be included within the draft DCO as required.

REGISTER OF COMMITMENTS AND CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

4.7.6. Environmental mitigation proposed as part of the ES will be contained in a Register of Commitments. This will provide a detailed description of the actions required by the main contractor during construction and the operator during operation and maintenance.

4.7.7. The draft Order will contain a requirement for a CEMP to secure the relevant mitigation items contained within the Register of Commitments. The CEMP will be the means of controlling the construction works and set out monitoring requirements, with the objective of ensuring that the effects of the construction works on people and the natural environment are reduced insofar as reasonably practicable.

4.7.8. A draft CEMP will not be provided with the application as all necessary detail of mitigation will be provided in the Register of Commitments.

MONITORING

4.7.9. The EIA Regulations require, where appropriate, the monitoring of potential significant adverse effects. Where monitoring arrangements are proposed as part of the mitigation set out, this will be detailed within each of the topic chapters of the ES and detailed within the Register of Commitments and draft

DCO and the results of any monitoring will be shared with the relevant organisations as appropriate.

4.8. ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

4.8.1. The ES will report on the likely significant environmental effects for the construction and operational (including maintenance) phases of the Proposed Development and will report an estimate, by type and quantity, of expected residues and emissions.

4.8.2. The design of the Proposed Development will continue to be progressed and there will be a need to continue refining the design up to the detailed design stage, requiring a certain level of flexibility to be maintained. Therefore, in line with PINS Advice Note Nine (Using the Rochdale Envelope) a parameter-based approach (the 'Rochdale Envelope' approach) will be adopted to define the envelopes within which the construction and operation of the Proposed Development would be undertaken.

4.8.3. These parameters will be defined within the Application drawings and the draft DCO. The parameters approach presents the maximum envelope within which the built development may be undertaken and as assessment of the parameters ensures the comprehensive 'worst case' assessment of the full area within which the Proposed Development could be brought forward. This ensures the assessment of environmental effects associated with the Proposed Development will be the worst case, and that the actual development to be carried out within the parameters would be no worse than the effects reported in this ES.

4.8.4. The detailed design and construction methodology for the Proposed Development will be developed within these parameters without the need for further assessment (though design approvals will be required to confirm compliance with the assessed parameters).

4.8.5. The following criteria will be considered when determining significance:

- Likelihood of occurrence;
- Geographical extent;
- Adherence of the proposals to legislation and planning policy;
- Adherence of the proposals to international, national and local standards;
- Sensitivity of the receiving environment or other receptor;
- Value of the affected resource;
- Whether the effect is temporary or permanent (to be defined within the ES);
- Whether the effect is short, medium, or long-term in duration (to be defined within the ES);
- Whether the effect is reversible or irreversible (to be defined within the ES);

- Inter-relationship between effects (both cumulatively and in terms of potential effect interactions); and
- The outputs of stakeholder and public engagement.

4.8.6. The methodology for assessing the significance of an effect will vary between environmental factors but in principle, will be based on the environmental sensitivity (or value / importance) of a receptor and the magnitude of change from baseline conditions. Where topic-specific guidance requires that specific criteria or scales for determining significance are to be used this will be outlined in the relevant chapter.

4.8.7. In the absence of topic-specific guidance, both the magnitude of change and sensitivity (or value / importance) will be assessed on a scale of high, medium, low and negligible. The significance of each effect will be assessed against the magnitude of change and the sensitivity (or value / importance) of the receptor or receiving environment using the matrix in Table 4-1.

Table 4-1: Matrix for Determining Significance of Effect

		Sensitivity of Receptor / Receiving Environment to Change			
		High	**Medium**	**Low**	**Negligible**
Magnitude of Change	**High**	Major	Major to Moderate	Moderate	Negligible
	Medium	Major to Moderate	Moderate	Minor to Moderate	Negligible
	Low	Moderate	Minor to Moderate	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

4.8.8. When a range has been included in Table 4-1, professional judgment will be used to define the significance. Only Moderate and Major effects are considered to be significant.

4.8.9. Tables which summarise the likely significant effects will be provided. These tables will outline sensitive receptors, mitigation measures and residual effects. A distinction will be made between direct and indirect; short, medium and long-term; permanent and temporary; and positive and negative effects.

4.8.10. Inter-project Cumulative Effects of other existing and approved projects and intra-project combined effects will be considered in a separate section as outlined in **Chapter 17**.

4.9. ASSESSMENT OF TRANSBOUNDARY IMPACTS

4.9.1. Regulation 32 of the EIA Regulations 2017 sets out the procedural duties required where the Secretary of State deems that an NSIP is likely to have significant effects on the environment in an EEA State; or where an EEA State deems that its environment is likely to be significantly affected by an NSIP. Further guidance is provided in PINS Advice Note Twelve.

4.9.2. As such, a description of any transboundary impacts that will be experienced as a result of the Proposed Development will be provided in the ES and this assessment of transboundary effects will be of effects experienced in other EEA States as a consequence of the Proposed Development. However, it is not anticipated that the Proposed Development will have significant transboundary effects.

4.10. STRUCTURE OF THE ES

4.10.1. At this stage it is anticipated that the ES will be structured as follows:

- Volume I: Non-Technical Summary
- Volume II: Main Text;
  - Chapter 1: Introduction
  - Chapter 2: Description of the Study Area and Surrounding Area
  - Chapter 3: Description of the Proposed Development
  - Chapter 4: Consideration of Alternatives
  - Chapter 5: Approach to EIA
  - Chapter 6: Air Quality
  - Chapter 7: Climate Change
  - Chapter 8: Cultural Heritage
  - Chapter 9: Ecology and biodiversity
  - Chapter 10: Land and Soils
  - Chapter 11: Landscape and Visual
  - Chapter 12: Major Accidents and Disasters
  - Chapter 13: Materials and Waste
  - Chapter 14: Noise and Vibration
  - Chapter 15: Population and Human Health
  - Chapter 16: Traffic and Transport
  - Chapter 17: Water Resources and Flood Risk
  - Chapter 18: Cumulative Effects
  - Chapter 19: Summary of the ES

- Volume III: Supporting Technical Appendices
- Volume IV: Supporting Figures and Plans

4.11. COORDINATION OF ASSESSMENTS

A number of additional assessments which will not directly form part of the ES, but which will be relied upon and referred to within the ES, will be completed and relevant documents submitted in support of the Application.

BIODIVERSITY NET GAIN ASSESSMENT

4.11.1. Following industry best practice guidance, the Biodiversity Net Gain assessment will analyse the habitats to be retained, enhanced, created or lost within the Site. It will identify whether habitat compensation is required and will demonstrate biodiversity benefits resulting from the Proposed Development.

DETAILED ARBORICULTURAL REPORT

4.11.2. The arboricultural work will include the following four elements:

Desk Study

4.11.3. The desk study provides the results of a review all known extant tree constraints which includes:

- Presence of tree preservation order and conservation area trees;
- Relevant designations within the site including the presence of ancient woodland or trees, or known veteran and notable trees; and
- Local planning policy.

Tree Survey

4.11.4. This will include a survey of all qualifying trees within and adjacent to the Site Boundary. All qualifying trees are inspected from ground levels using the Visual Tree Assessment (VTA) which is undertaken on the above ground proportion of the tree. This is a non-invasive method for ascertaining the physiological and structural condition of trees and may require the use of an acoustic mallet and small probe.

Tree Constraints Plan

4.11.5. A tree constraints plan will be provided for use by the designers to inform feasibility studies and subsequent designs. The plans will identify the above and below spatial constraints of the existing trees which includes their quality, position, crown spread, and root protection areas.

Detailed Arboricultural Report (and Supporting Method Statement)

4.11.6. Following completion of the tree survey and constraint mapping a detail report will be compiled including the following:

- Tree survey schedule which includes details of all the arboriculture features which have been surveyed; and
- Detailed Arboriculture Report which identifies the direct and indirect effects of the Proposed Development on existing trees and will put forward proposals for suitable mitigation measures where required.

4.11.7. The report will also include an Arboriculture Impact Assessment and Arboriculture Method Statement for the protection of the trees.

HABITATS REGULATIONS ASSESSMENT

4.11.8. The overarching aim of the HRA is to determine, in view of a site's conservation objectives and qualifying interests, whether a plan, either in isolation and / or in-combination with other plans or projects, could lead to adverse effects on the integrity of an International site. Given the proximity of the Proposed Development to several International Sites, a HRA will be prepared. This will provide the consenting authority with sufficient information to decide whether the Proposed Development will lead to Likely Significant Effects (LSE) on Internal Sites.

4.11.9. Where LSE are identified, a detailed assessment will be provided to assess whether the proposals could result in adverse effects on the integrity of relevant International sites. Whilst the over-arching objectives of EIA and HRA are similar, their scope, level of detail and terminology vary. As such, these processes will be undertaken separately. However, the scope presented within this EIA Scoping Report has been developed to ensure that the needs of these processes have been considered to ensure a coordinated assessment.

WATER FRAMEWORK DIRECTIVE (WFD) SCREENING REPORT

4.11.10. The Water Framework Directive (WFD) Screening Report will screen for both the potential construction and operational impacts of the Proposed Development upon the relevant WFD quality elements for ordinary watercourses, a transitional waterbody and objectives of the North West and Dee River Basin Management Plans, and groundwater resources.

4.11.11. This includes identifying likely risks to biodiversity, the biological, physico-chemical and hydromorphological quality of main watercourses (including; River Dee, River Gowy, Stanney Mill Brook, Shropshire Union Canal, Finchetts Gutter, Sandycroft Drain, Wepre Brook), nearby ordinary watercourses and groundwater quality, and the likely ability of good-practice methods to manage risks associated with pollutants typically experienced during construction and during the operational phase.

4.11.12. The WFD Screening Report will determine the need for a full WFD assessment. If required, the scope for a WFD assessment will be discussed with the EA and NRW.

FLOOD RISK ASSESSMENT AND FLOOD CONSEQUENCE ASSESSMENT

4.11.13. A Flood Risk Assessment (FRA) and a Flood Consequence Assessment (FCA) will be prepared to support the EIA in accordance with the National Planning Policy Framework (NPPF). The FRA and FCA will assess the potential implications of the Proposed Development on flood risk to people and property elsewhere, as well as assessing the potential risk of flooding to the Proposed Development.

4.11.14. A strategic approach to the potential impacts and sensitive receptors along the route will be undertaken due to the scale of the project however a more detailed assessment will be undertaken if required at specific locations of the proposals (e.g. AGIs) depending on the expected level of flood risk and potential receptors.

OUTLINE SURFACE WATER DRAINAGE STRATEGY

4.11.15. During operation, drainage would be relevant only for the above ground structures. The majority of those are minor installations and a surface water drainage strategy for the three AGI compounds will be required. Proposals for those assets will be supported by an outline surface water drainage strategy, which will comprise a concept design, agreed surface water discharge rates, pollution controls and attenuation storage if required. It is not proposed to prepare detailed design drawings, network calculations or details of outfalls at this stage.

OUTLINE CONSTRUCTION TRAFFIC MANAGEMENT PLAN AND OUTLINE CONSTRUCTION WORKERS TRAVEL PLAN

4.11.16. An Outline Construction Traffic Management Plan will be prepared to provide details of procedures for construction related traffic; including; number of vehicles; routes; frequency and timing of movements; worker hours and shift patterns; laydown areas and parking, and Abnormal Indivisible Loads. An Outline Construction Workers Travel Plan will also be prepared which will focus on minimising the traffic impacts associated with construction workers travelling to and from the site.

4.12. ASSESSMENT OF HEAT AND RADIATION

4.12.1. Schedule 4 of the EIA Regulations 2017 requires a consideration of the likely significant effects of the Proposed Scheme resulting from the emission of heat, light and radiation.

4.12.2. The pipeline will be below ground, and no relevant pathway or receptors have been identified that could lead to significant effects from the temperature of the CO2 stream. It is, therefore, proposed to scope out heat from the ES.

4.12.3. Lighting will be considered in terms of effects on ecology and landscape and visual impact.

4.12.4. No significant sources of radiation are anticipated and as such it is proposed to scope this topic out of the ES.

4.12.5. The effects of heatwaves, extreme weather and other external hazards will be considered within **Chapter 11**.

5. AIR QUALITY

5.1. INTRODUCTION

5.1.1. This Chapter considers the impact of the Proposed Development on local air quality. It sets out the baseline conditions, likely significant effects and mitigation, and the methodology proposed for the EIA on this topic. The proposed methodology follows guidance on air quality management published by Defra and Devolved Administrations (**Ref. 5-1**), Institute for Air Quality Management and Environmental Protection UK (**Ref. 5-2, 5-3,** and **5-4**), and Highways England (**Ref. 5-5**). As set out below, potential local air quality impacts occur during the construction phase of the Proposed Development only.

5.2. STUDY AREA

5.2.1. The Study Area considered for the air quality assessment is determined with reference to potential dust and particulate matter impacts during the construction phase.

5.2.2. Following Institute of Air Quality Management (IAQM) guidance (**Ref. 5-3**), the Study Area is defined as the zone:

- Within 350m of the Newbuild Infrastructure Scoping Boundary (used as a proxy for the area within which construction works could occur); and/or
- Within 100m from the side of routes to be used by construction traffic, up to 500m from any points of exit from construction works onto the local road network, including construction compounds and/or pipeline corridor (used for consideration of impacts from the track-out of dirt from site).

5.2.3. In addition, the Study Area(s) for potential impacts from construction traffic and diversionary routes will be defined as the corridor(s) within 200m of routes likely to experience a significant change in traffic (defined in **Section 5.7**). It is anticipated that air quality effects as a result of the construction activities will not be significant outside of these areas. Furthermore, no operational effects on air quality are expected and consequently there is no reason to define an operational Study Area. This is set out in **paragraphs 5.5.4** and **5.5.5** below.

5.3. BASELINE CONDITIONS

5.3.1. Flintshire County Council (FCC) and Cheshire West and Chester Council (CWCC) undertake air quality monitoring in the vicinity of the Newbuild Infrastructure Scoping Boundary (**Ref. 5-6** and **5-7**). This consists primarily of nitrogen dioxide (NO_2) diffusion tube monitoring, but also includes continuous monitoring of particulate matter, nitrogen dioxide and sulphur dioxide at a subset of the locations (CWCC only).

5.3.2. FCC has not declared any Air Quality Management Areas (AQMA) and the monitoring locations nearest the Newbuild Infrastructure Scoping Boundary show that concentrations are well within the UK's air quality objective for NO_2, including at roadside locations. The maximum monitored annual mean concentration in the vicinity of the Study Area was 28.2µg/m^3 in 2018 (latest available data) on Aston Hill, alongside the A494 in Deeside. The UK's objective for annual mean NO_2 is 40µg/m^3.

5.3.3. Under their Supplemental Air Quality Plan (**Ref. 5-8**), Welsh Government has imposed 50mph speed limits on the A494 in Deeside (including Aston Hill) to reduce roadside NO_2 concentrations. Their latest monitoring shows that roadside concentrations are within the limit value, also 40µg/m^3, set out in Welsh regulations (**Ref. 5-9**). The same limit value is also set out in English regulations (**Ref. 5-10**), but no other roads within or in the vicinity of the Study Area, whether in England or Wales, are identified as potentially exceeding the limit value.

5.3.4. Away from major roads, NO_2 concentrations fall to background levels of less than 20µg/m^3 in built up / industrial areas and less than 10µg/m^3 in rural areas.

5.3.5. CWCC has declared 5 AQMA, one of which has been revoked. The Study Area passes through one of these, the Thornton le Moors AQMA, declared on account of exceedances of the UK's objective for 15-minute mean sulphur dioxide (SO_2). Monitoring in 2018 shows that exceedances of the objective are ongoing, although the Proposed Development will not result in emissions of SO_2. NO_2 concentrations in Ellesmere Port are elevated but in 2018 were below the objective at all monitoring stations, including within the Whitby Road / Station Road AQMA (approximately 4km from the Study Area).

5.3.6. Monitoring of particulate matter as PM_{10} (particles with diameter less than 10 microns) shows concentrations less than 15µg/m^3, even in industrial areas. This is well within the annual mean objective (40µg/m^3). Furthermore, the daily mean standard was not exceeded in 2018 in the vicinity of the Study Area.

5.4. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

5.4.1. Mitigation of impacts during the construction phase will be based upon best practice methods to reduce emissions of dust and particulate matter from construction works and traffic management measures. The measures will be set out within the Register of Environmental Actions and Commitments submitted as part of the Environmental Statement (ES).

5.4.2. The mitigation measures will cover all aspects of construction works including:

- General site management practices, site and construction compound design;
- Monitoring and reporting responsibilities;

- Site clearance and earthworks;
- Handling and storage of materials;
- Use of site and haulage roads, including traffic management; and
- Equipment maintenance.

5.4.3. No opportunities or, indeed, requirements for mitigation during operation have been identified.

5.5. DESCRIPTION OF LIKELY SIGNIFICANT EFFECTS

5.5.1. The following sensitive receptors will be considered as part of the assessment:

- Areas of potential public exposure to pollution including; residential properties, hospitals, schools, nurseries, care homes, places of worship, and areas of short-term exposure such as footpaths; and
- Sites designated for nature conservation, potentially including; Mynydd y Fflint Site of Special Scientific Interest (SSSI) and River Dee Special Area of Conservation (SAC) and SSSI.

5.5.2. The potential likely significant effects on the receptors identified, associated with the construction phase, will relate to:

- Increased dust deposition from construction activities resulting in loss of amenity and harm to ecological receptors;
- Increased exposure to particulate matter (PM_{10} / $PM_{2.5}$) in relation to human health; and
- Increased exposure to emissions from vehicles (NO_2 / PM_{10} / $PM_{2.5}$) from construction plant and construction vehicle movements.

5.5.3. Air quality effects arising from the construction phase of the Proposed Development will, however, be of temporary nature for the duration of the construction phase, currently planned for approximately 18 months.

5.5.4. No likely significant effects on local air quality have been identified for the operational phase. In particular, operational traffic flows are anticipated to be well below any thresholds triggering the need for assessment (e.g. at its most stringent, IAQM guidance states that, within AQMA, 100 vehicles per day is an appropriate assessment criteria). Based on information currently available, routine traffic flows associated with the Above Ground Installations (AGI) and carbon dioxide pipeline maintenance will be well below this level.

5.5.5. During shutdown and maintenance operations, there is the potential for the release of small quantities of odorous substances, associated with impurities in the gas (primarily hydrogen sulphide). Such activities will, however, be highly infrequent and managed by best practice measures. There will be no routine venting from the Proposed Development. As such, they would not result in

significant loss of amenity or nuisance and are scoped out of the air quality assessment.

Table 5-1: Elements Scoped in or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Air quality impacts arising from Existing Pipeline Works (excluding Block Valve Stations)	Construction Operation		✔	No physical works consented within this Application. Therefore, no impact pathways relevant to air quality.
Air quality impacts arising from the construction of the Proposed Development	Construction	✔		Construction works, plant and traffic have the potential to adversely affect nearby air quality sensitive receptors.
Air quality impacts arising from the operation of the Proposed Development	Operation		✔	No potentially significant sources of emissions of local air quality pollutants during operation.

5.6. OPPORTUNITIES FOR ENHANCING THE ENVIRONMENT

5.6.1. There are limited opportunities for enhancement with respect to air quality other than mitigation measures discussed earlier.

5.7. PROPOSED ASSESSMENT METHODOLOGY

5.7.1. The proposed methodology for the air quality assessment is compliant with the requirements of the NPS EN-1, specifically paragraphs 5.2.6 – 5.2.7, and NPS EN-4 in that it permits the identification of any significant air emissions, including those from the generation of road traffic, and the residual effects from those emissions taking into account mitigation. Existing air quality and, if appropriate, the change in air quality resulting from the proposals, will be quantified with reference to the UK's national air quality limits.

5.7.2. In line with the primary considerations of the IPC decision making, the methodology sets out a risk-based approach to the assessment of impacts where there are likely existing breaches of air quality limits.

5.7.3. NPS EN-4 requires that, for air quality, the overarching requirements of NPS EN-1 are met, but in addition that an assessment of any adverse effects due to the venting of gas is included. As set out in **Chapter 3: Description of the Proposed Development**, given the nature of the Proposed Development, with no routine venting of gas proposed, there are no likely significant adverse effects due to venting of gas and such effects have been scoped out.

5.7.4. It is proposed that the assessment of air quality impacts during construction be undertaken qualitatively, following relevant guidance of the IAQM.

5.7.5. No additional air quality surveys are proposed at this stage.

5.7.6. The IAQM approach to construction dust involves:

- The identification of emission sources and construction activities and the estimation of their potential emission magnitude;
- The identification of sensitive receptors for air quality impacts and the assessment of the sensitivity of the area to dust and particulate matter emissions; and
- The estimation of the risk of impacts, taking into account the proximity of emission sources to the receptors and their magnitude.

5.7.7. The determined risk level will then be used to define appropriate and proportionate best practice mitigation measures as and where necessary.

5.7.8. The IAQM guidance recommends that the assessment of significant effects is only made after consideration of mitigation.

5.7.9. IAQM guidance recommends that, in general, impacts from construction plant can be scoped out of the assessment. Notwithstanding this, the potential impacts of plant, particularly within compounds and/or proposed AGI will be considered qualitatively within the IAQM risk based framework to ensure appropriate mitigation is included within the design.

5.7.10. Similarly, impacts from construction traffic will also be considered qualitatively since flows are not expected to exceed levels that would warrant quantitative assessment. EPUK/IAQM guidance states that assessment should be considered where there is:

- A change of light-duty vehicle flows of:
  - More than 100 vehicles/day (as an annual average, termed AADT) within or adjacent to an AQMA; and/or
  - More than 500 AADT elsewhere;

- A change of heavy-duty vehicle flows of:
  - More than 25 AADT within or adjacent to an AQMA; and/or
  - More than 100 AADT elsewhere.

5.7.11. These criteria will be used, in combination with baseline air quality information, to screen the forecast construction traffic flows for their potential to result in significant effects.

5.7.12. If, as anticipated, flows on individual roads do not trigger these criteria, then advice will simply be provided to the transport planners on the locations of potential sensitive receptors to allow appropriate traffic management to take account of air quality impacts. If the criteria are exceeded, then baseline air quality will be reviewed to assess the potential for significant effects. If baseline air quality data indicates a potential exceedance of air quality thresholds, then dispersion modelling may be required. If required, this would utilise the ADMS model and vehicle emissions factors from Department for Transports Emissions Factor Toolkit (v10.1). This is, however, considered unlikely to be necessary.

5.7.13. We will consult with the Environment Health Departments at CWCC and FCC to agree the methodology. Importantly, should traffic flows trigger the assessment criteria set out above, we with undertake further consultation with the relevant departments to agree the need for dispersion modelling, its spatial extent and the locations of receptors for impacts.

5.7.14. If quantitative assessment of traffic impacts is required, the approach set out in the EPUK/IAQM guidance on Air Quality and Planning will be used to describe the air quality effects of the operation of the Proposed Development. The guidance recommends that the degree of an impact is described by expressing the magnitude of incremental change in pollutant concentration as a proportion of the relevant assessment threshold (air quality objective or limit value) and examining this change in the context of the total concentration.

5.7.15. The EPUK/IAQM guidance states that the assessment of overall significance should be based on professional judgement, taking into account several factors, including:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

5.7.16. The EPUK/IAQM guidance states that for most road transport related emissions, long-term average concentrations are the most useful for evaluating the severity of impacts; this is likely to hold for on-airport sources as well given their linear nature.

5.7.17. The overall air quality effects of the Proposed Development will be described as either 'negligible', or of 'slight', 'moderate' or 'substantial' significance, as follows:

- **Major adverse or beneficial effect**: The Proposed Development could be expected to have a significant effect (either positive or negative) on local air quality conditions in the Study Area;
- **Moderate adverse or beneficial effect**: The Proposed Development could be expected to have a noticeable effect (either positive or negative) on local air quality conditions in Study Area;
- **Minor adverse or beneficial effect**: The Proposed Development could be expected to result in a small, barely noticeable effect (either positive or negative) on local air quality conditions in the Study Area; and
- **Negligible/None**: No discernible effect is expected as a result of the Proposed Development on local air quality conditions in the Study Area.

5.7.18. Air quality impacts over sites designated for nature conservation will be reported within the Air Quality Chapter of the Environmental Statement (ES). However, the assessment of potentially significant effects will be made in the Biodiversity Chapter. Notwithstanding this, the Air Quality Chapter will set out where, according to IAQM guidance, the impacts can be described as negligible.

5.7.19. The significance criteria will be discussed and agreed with CWCC and FCC.

5.8. LIMITATIONS AND ASSUMPTIONS

5.8.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- The proposed methodology for construction traffic (qualitative assessment only) is predicated on current information on likely flow generation. As noted above, the assumed study area and requirements for quantitative assessment will be reviewed when detailed forecasts are available.
- No air quality surveys are proposed at present. However, this will be reviewed should quantification of traffic impacts be required. This will be discussed and agreed with the Environment Health Departments at CWCC and FCC;
- There is limited design information available at the time of preparing this EIA Scoping Report. The assessment presented in the Preliminary Environmental Information Report (PEIR) and ES will include the latest design information available at the time of our submission. Where design information is not available, worst case assumptions will be made.

5.9. REFERENCES

- **Ref. 5-1** Local Air Quality Management Technical Guidance TG(16) - Defra and the Devolved Administrations (2018)
- **Ref. 5-2** Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) joint guidance on Planning for Air Quality (2017)
- **Ref. 5-3** Institute of Air Quality Management (IAQM) guidance on the Assessment of Dust and from Demolition and Construction (2014)
- **Ref. 5-4** Institute of Air Quality Management guidance on the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (2020)
- **Ref. 5-5** Highways England, Design Manual for Roads and Bridges: Air Quality (LA105) (2019)
- **Ref. 5-6** North Wales Authorities Collaborative Report, 2019 Air Quality Progress Report (2019)
- **Ref. 5-7** Cheshire West and Chester Council, 2019 Air Quality Annual Status Report (2019)
- **Ref. 5-8** Welsh Government, Tackling roadside nitrogen dioxide concentrations in Wales: Welsh Government supplemental plan to the UK plan for tackling roadside nitrogen dioxide concentrations (2018)
- **Ref. 5-9** The Air Quality Standards (Wales) Regulations 2010, WSI 2010 No 1433 (W. 126)
- **Ref. 5-10** The Air Quality Standards Regulations 2010, UKSI 2010 No 1001

6. CLIMATE

6.1. INTRODUCTION

6.1.1. This Chapter considers the impact of the Proposed Development on climate and vulnerability to climate change during construction and operation, and any potential significant effects. It sets out the proposed methodology for the climate assessment and identifies those impacts that can be scoped out of the EIA.

6.1.2. This Chapter considers the impacts and effects of the Proposed Development in terms of:

- The contribution to climate change: the greenhouse gas (GHG) emissions assessment; and
- The vulnerability of the Proposed Development to climate change (climate change resilience and adaptation).

6.1.3. The chapter is divided into the two aspects above and describes, for each, the assessment methodology and the baseline conditions relevant to the assessment. These have been used to identify the likely significant effects.

GREENHOUSE GASES

6.2. STUDY AREA

6.2.1. The assessment of GHG is not restricted by geographical area but instead includes any increase or decrease in emissions as a result of the Proposed Development, wherever that may be. This includes:

- Construction emissions from the Proposed Development footprint but also relating to the transport of materials to and from the site and their manufacture. This may be distant from the Proposed Development location, for example, GHG emissions associated with the manufacture of steel in terms of embodied carbon and energy in the production process); and
- Operational emissions (increase or reduction) which result from the end-use of the Proposed Development. In this case, GHG emissions include on-site fuel use, fugitive gasses and emissions avoided by carbon capture and storage (CCS).

6.3. BASELINE CONDITIONS

6.3.1. In the baseline (Do Minimum) scenario, GHG emissions occur constantly and widely as a result of natural and human activity, including land use and land use change, transport, energy consumption (e.g. fossil fuels for purchased energy from the grid and/or other sources) and industrial processes.

6.3.2. The GHG assessment would only consider instances in which the Proposed Development results in additional or avoided emissions in comparison to the baseline scenario and the Proposed Development's assumed evolution.

6.3.3. The baseline conditions therefore focus on those sources of emissions subject to change between the baseline scenario and the Proposed Development. To provide additional context, the emissions from 2018 within Cheshire West and Chester, Flintshire and nationally are presented in **Table 6-1** (**Ref. 6-1**).

Table 6-1: Annual GHG Emissions in Cheshire West and Chester, Flintshire and Nationally (2018)

Emissions Sources	Cheshire West and Chester ($ktCO_2$)	Flintshire ($ktCO_2$)	National (UK) ($ktCO_2$)
A. Industry and Commercial Electricity	373.4	190.4	42,794.1
B. Industry and Commercial Gas	315.2	168.4	36,192.5
C. Large Industrial Installations	1,274.2	648.3	31,442.7
D. Industrial and Commercial Other Fuels	147.6	82.3	16,900.1
E. Agriculture	37.1	15.9	5,963.8
Industry and Commercial Total	**2,147.4**	**1,105.2**	**133,293.3**

6.4. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

6.4.1. The magnitude of GHG emissions associated with the design and construction phase of the Proposed Development can be minimised by taking into account the following measures (key examples):

- Design optimisation to reflect the carbon reduction hierarchy (detailed below and found in clause 6.1.4 of BSI (2016) Publicly Available Specifications: 2080 Carbon management in Infrastructure, hereafter referred to as PAS 2080) (**Ref. 6-2**);
  - Reduce the elements required for the Proposed Development;
  - Reduce the requirement for construction materials;

  - Substitute-in and use alternative raw materials and resources (e.g. using low temperature asphalt, concrete with a higher Ground Granulated Blast-furnace Slag (GGBS) content with lower embodied carbon;
  - Use efficient construction processes, such as embracing design for manufacture and assembly.
- Maximising the opportunity to use more sustainable materials by specifying in procurement documentation, that materials and products with reduced embodied carbon emissions, and materials/resources featuring recycled content (where safe and of sufficient integrity for engineering), supported with eco- and carbon labels or verified Environmental Product Declarations (EPD) are favoured and should be used;
- Designing, specifying and constructing the Proposed Development with a view to maximising the operational lifespan and minimising the need for maintenance and refurbishment (and thus reducing the frequency of releasing associated GHG emissions);
- Designing, specifying and constructing the Proposed Development with a view to maximising the potential for the reuse/repurposing, recycling and/or recovery of materials and components of the Proposed Development at its end-of-life stage. The Proposed Development should be designed to avoid disposal of materials into landfill when and if it is decommissioned;
- Implement a Construction Environmental Management Plan (CEMP), incorporating a Site Waste Management Plan (SWMP) and Materials Management Plan (MMP) by the Principal Contractor;
- Specifying efficient mechanical and electrical equipment such as lighting and telecommunications that is long-lasting and based on its durability, repairability and energy efficiency credentials;
- Minimising the quantities of materials required to construct the Proposed Development;
- Using locally sourced materials where available and practicable to minimise the distance materials are transported from source to site;
- Using more modern and efficient low emission construction plant and delivery vehicles, and/or those powered by electricity from alternative/lower carbon fuels. Contractors to ensure high performance of plant and equipment through correct and efficient operation, maintenance and servicing of vehicle fleet to avoid polluting emissions;
- The contractor having training policies and management protocols in place to avoid idling of engines, spills of fuels (e.g. when refuelling) and safe/environmentally sensitive driving techniques to maximise fuel saving;

- Consider using suppliers and companies in the supply chain that have strong environmental, social and governance (ESG) ratings and possibly certifications that enhance their sustainability performance; and
- Using innovative construction methods (e.g. optimising gradients of haul and access roads/points) to reduce plant use and minimise the need for sharp acceleration and braking in order to save fuel.

6.5. DESCRIPTION OF LIKELY SIGNIFICANT EFFECTS

6.5.1. The potential sources of GHG emissions associated with the Proposed Development (including the four Block Valves Stations (BVS) located along the Flint-PoA Pipeline) are identified in **Table 6-2**.

Table 6-2: Key Emissions Sources During the Proposed Development's Lifespan

Lifecycle Stage (as per PAS 2080) (Ref 6-2)		Potential Sources of Emissions (not exhaustive)
CONSTRUCTION	Product stage (manufacture and transport of raw materials to suppliers) (A1-3)	Embodied emissions associated with extraction and manufacturing of the required raw materials.
	Transport of materials to site (A4)	Emissions from fuel and electricity (e.g. for electrically powered vehicles) used in vehicles transporting materials to site.
	Plant and equipment use during construction (A5)	Emissions from fuel and electricity used in plant and equipment on site.
	Transport of waste (A5)	Emissions from fuel/energy used in vehicles transporting materials to destinations away from the site.
	Disposal of waste (A5)	Emissions from the final disposal of waste materials (e.g. methane from the breakdown of materials in landfill).
	Land use, land use change and forestry (A5)	Change in emissions associated with the clearance and disposal of biomass due to the Proposed Development.

Lifecycle Stage (as per PAS 2080) (Ref 6-2)		Potential Sources of Emissions (not exhaustive)
OPERATION	Operational energy use (B1/B6)	Emissions from lighting at Above Ground Installations (AGI) and monitoring/testing of the carbon dioxide pipeline.
	Maintenance, repair, replacement, refurbishment (B2-5)	Embodied emissions, and emissions from transport and plant associated with maintenance, repair, replacement, and refurbishment.
	Land use, land use change and forestry (B8)	Change in emissions associated with the existence of the Proposed Development hindering or promoting the sequestration of carbon dioxide into biomass.
	Fugitive gas emissions (B8)	Emissions from the possible leak of gases.
	Avoided emissions (D)	Change in emissions from the use of CCS.
END OF LIFE	Decommissioning process (C1)	Emissions from decommissioning work (i.e. fossil fuel and electricity).
	Transport and disposal of materials (C2-4)	Emissions sources as fuel/energy consumption from the transport of materials to disposal sites or recovery.

6.5.2. The impact of GHG emissions from any new development relates to their contribution to global warming and thus anthropogenic influenced climate change. These impacts are global and cumulative in nature, with every tonne of GHGs contributing to impacts on natural and human systems. GHG emissions result in the same global effects wherever and whenever they occur and, therefore, the sensitivity of different human and natural receptors is not considered.

6.5.3. The magnitude of emissions associated with the Proposed Development (including the block valves along the Flint-PoA Pipeline) cannot be quantified until an ES is produced, and as such the impact of the Proposed Development on the climate is not currently known.

6.5.4. Based on the emissions sources identified in **Table 6-2** and using guidance from the Institute of Environmental Management and Assessment (IEMA) (**Ref**

6-3), professional judgement has been used to determine which sources to scope into the assessment or out from further consideration in the ES.

6.5.5. A summary of this proposed scope is presented in **Table 6-3**. The aspects which have been scoped into further assessment, as identified in **Table 6-3**, may lead to significant effects.

Table 6-3: Elements Scoped In or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Product stage (manufacture and transport of raw materials to suppliers) (A1-3)	Construction	✔		Raw materials will result in embodied emissions and have the potential to be large.
Transport of materials to site (A4)	Construction	✔		Construction stage emissions from fuels/energy consumption due to the delivery of material to site have the potential to be large.
Plant and equipment use during construction (A5)	Construction	✔		Fuel/energy consumption of plant and equipment used during construction would generate GHG emissions.
Transport of waste (A5)	Construction	✔		Emissions from fuel/energy consumption due to the transport of waste materials, particularly fill, have the potential to be large.
Operational energy use (B1/B6)	Operation	✔		Emissions from the operation of lighting and monitoring

Element	Phase	Scoped In	Scoped Out	Justification
				equipment would generate Scope 2 GHG emissions from the production of electricity.
Maintenance and refurbishment (B2, B3, B5)	Operation	✔		The maintenance, repair, replacement and/or refurbishment would release emissions.
Fugitive gas emissions (B8)	Operation	✔		Emissions from the possible leak of CO_2 from the carbon dioxide pipeline.
Avoided emissions (D)	Operation	✔		This will cover all avoided emissions as part of the Project. This is because the Proposed Development cannot function in isolation.
Disposal of waste (A5)	Construction		✔	It is not anticipated that there will be large quantities of waste, therefore emissions from the disposal of waste are unlikely to be large. This will be reviewed again at the ES stage.
Land use, land use change and forestry (A5)	Construction		✔	Due to the type and quantity of biomass, emissions from the disposal of biomass are not expected to be large.

Element	Phase	Scoped In	Scoped Out	Justification
Replacement (B4)	Operation		✔	No major replacements are expected throughout the lifespan. Therefore, emissions from replacement are anticipated to be negligible.
Land use, land use change and forestry (B8)	Operation		✔	The reduction in carbon sequestration is not considered to be large as the existing land type is predominately grassland, which has minimal carbon sequestration potential.
Decommissioning process (C1)	End of Life		✔	When the Proposed Development reaches the end of its useful life, it is expected that the carbon dioxide pipeline and block valves will be left in-situ and the AGI will be dismantled. It is therefore expected that emissions from decommissioning the Proposed Development are not considered to be large and have been excluded from further assessment.
Transport and disposal of materials C2-4	End of Life		✔	

6.6. OPPORTUNITIES FOR ENHANCING THE ENVIRONMENT

6.6.1. By utilising the mitigation measures for the Proposed Development design, as well as during construction and operation, as per **Section 6.4**, impacts on GHG emissions can be reduced.

6.7. PROPOSED ASSESSMENT METHODOLOGY

6.7.1. This section draws on the assessment principles of EN-1 and EN-4. The assessment approach considers the likely magnitude of GHG emissions (or avoided emissions) in comparison to the baseline scenario without the Proposed Development. It considers emissions throughout the lifecycle of the Proposed Development including:

- Construction stage, for example, embodied GHG emissions associated with materials, transportation of materials to site and waste/arisings from site, and the construction process; and
- Operation, for instance, avoided emissions from the use of CCS, fugitive gas loss, maintenance and replacement of original materials.

CALCULATION OF GHG EMISSIONS

6.7.2. Following guidance from IEMA (**Ref. 6-2**), PAS 2080 (**Ref. 6-3**) and the Royal Institute of Chartered Surveyors (RICS) (**Ref. 6-4**), for all lifecycle stages and sub-stages of the Proposed Development, the assessment would include the following:

- Collection of available data/information on the scale of GHG emitting activities (e.g. tonnes of concrete or litres of fuel) for the baseline scenario and for the Proposed Development. In each case this will cover the whole study period; and
- Calculation of the GHG emissions by applying a suitable emissions factor (tCO_2e per unit of emissions generating activity) where appropriate.
- In the case of fugitive gas emissions (B8), gasses may leak slowly over time as a completely impermeable seal of the carbon dioxide pipeline is not possible. The predicted worst-case leak rate will be used to estimate emissions using data published by BEIS.

SIGNIFICANCE CRITERIA

6.7.3. The significance of GHG impacts has been assessed through comparing estimated GHG emissions arising from the Proposed Development and the respective UK carbon budgets (**Table 6-4**), which have been set by the UK Government covering 2018 to 2032 (expressed in millions of tonnes of carbon dioxide equivalents (MtCO2e).

6.7.4. The Sixth Carbon Budget (**Ref. 6–5**) report was released by the Committee on Climate Change (CCC) in December 2020, which sets the limit on allowed UK territorial GHG emissions over the period 2033 to 2037. The CCC advise the 'Balanced Net Zero Pathway', reducing emissions by 2035 to 78% below 1990 levels. However, at this point in time this is advice/guidance although it is set to be legislated by the middle of 2021.

6.7.5. There are currently no agreed thresholds for what level of GHG emissions is considered significant in an EIA. The significance of GHG emissions is assigned with reference to the magnitude of emissions, their context, guidance from IEMA and the use of professional judgement.

Table 6-4: National Carbon Budgets Set by the Government ($MtCO_2e$)

Carbon Budget Period	UK Carbon Budget
Third: 2018-2022	2,544 $MtCO_2e$
Fourth: 2023-2027	1,950 $MtCO_2e$
Fifth: 2028-2032	1,725 $MtCO_2e$

LEGISLATION AND POLICY

6.7.6. The following legislation and policy will be relevant to the assessment:

- The Climate Change Act (2008) (**Ref. 6-6**);
- United Nations Framework Convention on Climate Change (**Ref. 6-7**);
- Cheshire West and Chester Climate Emergency Response Plan (2021) (**Ref. 6-8**); and
- Flintshire County Council - Environment and Sustainability Policy (**Ref. 6-9**).

6.8. LIMITATIONS AND ASSUMPTIONS

6.8.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- The assessment of significance will be based, in part, on professional judgement;
- Some small emissions sources have been excluded as emissions from these sources are not considered likely to be large and therefore not material to the assessment.
- PAS 2080 stage D (avoided emissions) will include all avoided emissions as a result of the Proposed Development as part of the Project as the Proposed Development cannot function in isolation.

CLIMATE RESILIENCE

6.9. STUDY AREA

6.9.1. The Study Area for climate resilience refers to the impact of climate on the Proposed Development (rather than the impact of the Proposed Development on the environment). As such, the Study Area is the Newbuild Infrastructure Scoping Boundary and the immediate area within the Newbuild Infrastructure Scoping Boundary (in order to address in-combination climate impacts).

6.10. BASELINE CONDITIONS

6.10.1. The IEMA EIA Guide to Climate Change Resilience and Adaptation (**Ref. 6-10**) identifies the need for a baseline in order to consider:

- The current climate baseline (defined by historic climate conditions) to provide an indication of past vulnerability; and
- The future climate baseline (short-term extremes and long-term variation) to assess a project's vulnerability to climate change.

CURRENT BASELINE

6.10.2. The Proposed Development is located in the Met Office climate profile of North West England (**Ref. 6-11**), which is characterised as having a climate of great variety from a 30-year averaging period of 1981-2010. The region includes both the coldest place in England (Cross Fell in the Pennines) and the wettest place in England (the Lakeland fells around Seathwaite in Cumbria). The closest weather station to the Proposed Development is Hawarden (approximately 15km from Stanlow Refinery).

Precipitation

6.10.3. The North West of England region has some of the wettest places in the UK, with the higher parts of the Lake District averaging over 3200mm of rainfall per year and the more sheltered areas of Cheshire and the Eden valley in Cumbria drier with less than 800mm per year (**Ref. 6-12**).

6.10.4. Average monthly rainfall data at Hawarden weather station (**Ref. 6-12**), the North West of England region, and for the UK for the period 1981–2010 is presented in **Table 6-5**. It shows that the area covered by Hawarden weather station is drier than the UK average even though the North West of England region is wetter.

Table 6-5: Long-term Average Monthly Rainfall (1981–2010) for Hawarden Weather Station, the North West of England region and, by Comparison, Rest of the UK

Season	Precipitation (mm)		
	Hawarden	North West of England	UK Average
Summer	57.6	92.8	80.3
Winter	59.8	126.1	110.2
Annual	60.5	109.9	96.2

Extreme Precipitation

6.10.5. The North West of England region is wetter than the UK average and it experiences extreme rainfall events, classified as where rainfall exceeds 10mm per day (**Ref. 6-13**).

6.10.6. Periods of prolonged rainfall are often associated with Atlantic depressions or with convection (**Ref. 6-14**). The Atlantic lows are more vigorous in autumn and winter. In summer, convection caused by solar surface heating sometimes forms shower clouds and a large proportion of rain falls from showers and thunderstorms. Rainfall caused this way is normally more intense than winter rainfall which tends to be more frontal with falls occurring over longer periods. Some noteworthy extreme rainfall, drought and storm events include:

- Heavy rainfall July 2019: Thunderstorms from an area of low pressure caused flooding across parts of northern England due to intense downpours. Parts of South Manchester and East Cheshire were badly affected by flash-flooding with widespread flooding of properties and road closures across the region (**Ref. 6-15**).
- November 2012: A sequence of heavy rainfall events resulted in one of the wettest weeks in England in the last 50 years (**Ref. 6-16**).

Snow and Ice

6.10.7. Snowfall is closely linked with temperature, with falls rarely occurring if the temperature is higher than 4°C. For snow to lie for any length of time, the temperature must normally be lower than this. Over most of the North West of England region, snowfall is normally confined to the months from November to April, but upland areas may have falls in October and May. Snow rarely lies outside the period from November to March but over higher ground lying snow can also occur in October and as late as May. The region has experienced snow events in:

- February to March 2018: the most significant spell of snow and low temperatures for the UK overall since December 2010 (**Ref. 6-17**).
- December 2009 to January 2010: the UK experienced a spell of very low temperatures and significant snowfalls which affected almost the whole country (**Ref. 6-18**).
- December 2010: two spells of snowfall lasting around a month (**Ref. 6-19**).

Temperature

6.10.8. The temperature in the North West of England depends very much on altitude and proximity to the coast. Over the lower-lying areas inland the average varies from around 10.5°C in Cheshire to 9°C in the Solway Plain and there is an approximate decrease of 0.5°C for each 100m increase in altitude. The highest values occur along the coasts of the Isle of Man, Merseyside and Lancashire, whilst the lowest occur at the higher altitudes such as the Lake District fells and Pennines. Temperature at ground level depends on seasonal fluctuations, local heat flow and thermal conductivity of the ground. Temperature decreases with increasing depth. The average increase, referred to as the geothermal gradient, for the UK is 2.6°C per 100 m (**Ref. 6-20**).

6.10.9. **Table 6-6** shows the long-term average mean monthly temperature for Hawarden Weather station, the North West of England region and for the UK between 1981 and 2010. It shows that the area around the Proposed Development is slightly warmer by comparison with the North West of England region and the rest of the UK.

Table 6-6: Long-term Average Mean Monthly Temperature for Hawarden Weather Station and the North West of England, by Comparison with the Rest of the UK

Season	Temperature (°C)		
	Hawarden	**North West of England**	**UK average**
Summer	15.7°C	14.4°C	14.4°C
Winter	4.8°C	3.8°C	3.7°C
Annual	10.3°C	8.9°C	8.9°C

Extreme Temperature

6.10.10. The region experiences extreme temperatures. Some noteworthy extreme temperature events include:

- July 2020: the UK experienced a short but exceptional heatwave in late July. Temperatures exceeded 30°C widely across much central and southern

England on the 23rd, and across the south and east on the 24th, but the 25th was by far the hottest day with 30°C recorded through much of northern England (**Ref. 6-21**).

- Summer 2018: warm, dry, sunny weather with the UK under the influence of high pressure, particularly during June and July. This was the UK's warmest summer since 2006, the driest since 2003 and the sunniest since 1995 (**Ref. 6-22**).
- December 2010: the coldest December in over 100 years as a result of persistent easterly or north-easterly winds bringing bitterly cold air from northern Europe and Siberia, accompanied by snow. Temperatures struggled to rise above freezing during the day and there were very severe frosts at night. Temperatures widely fell below -10°C on several nights (**Ref. 6-23**).

Wind and Storms

6.10.11. North West England is among the more exposed parts of the UK, being relatively close to the Atlantic and containing large upland areas. The strongest winds are associated with the passage of deep areas of low pressure close to or across the UK. The frequency and strength of these depressions is greatest in the winter half of the year, especially from December to February, and this is when mean speeds and gusts are strongest. As Atlantic depressions pass the UK the wind typically starts to blow from the south or south west, but later comes from the west or north-west as the depression moves away. The range of directions between south and north-west accounts for the majority of occasions and the strongest winds nearly always blow from this range of directions.

6.10.12. A day of gale is defined as a day on which the wind speed attains a mean value of 34 knots or more over any period of ten minutes. Notable gales affecting the region include:

- Storm Ciara was the third named storm of the 2019/2020 season and the most severe storm of the winter season. Amber warnings were issued for both strong wind and heavy rain. Winds gusted at over 60 knots widely across England and Wales and in terms of gust speeds this was the most significant storm across England and Wales overall since 12 February 2014 (**Ref. 6-24**).
- The UK experienced a turbulent week of weather from 10 to 16 March 2019 as a succession of Atlantic low-pressure systems brought strong winds and heavy rain, driven by a powerful jet stream. This spell included Storm Gareth on 12 to 13 March, the seventh named storm of the 2018-2019 winter (**Ref. 6-25**).

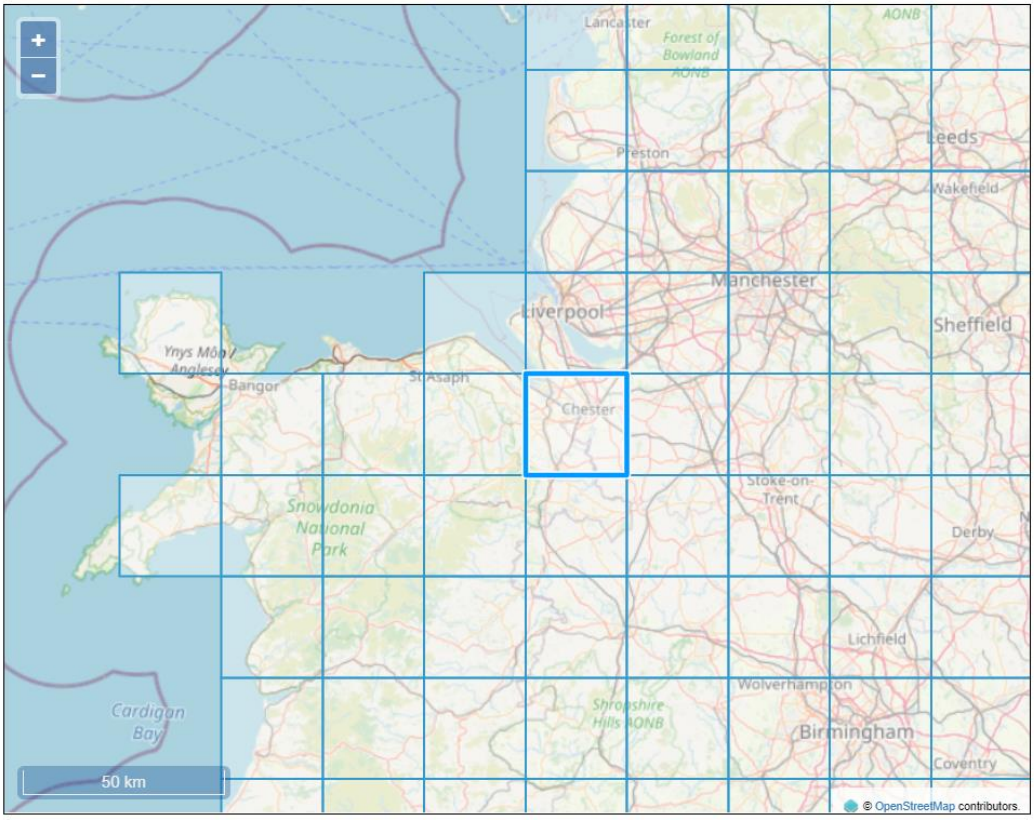
Sea Level

6.10.13. Stanlow Refinery is located approximately 1.73 km from the tidal mouth of River Mersey, bounded to the Irish Sea. The coastline is naturally vulnerable to sea level rise. Sea level around the UK rose by about 1mm/year in the 20th century, corrected for land movement (**Ref. 6-26**). Flood Mapping of the UK indicates a high likelihood of flooding throughout the Proposed Development. However, the flood map also indicates the Proposed Development is in an area that benefits from flood defences (**Ref. 6-27**). Please refer to **Figures 3-9** to **3-12** shown in **Appendix A: Figures**.

FUTURE BASELINE

6.10.14. The UK Climate Projections 2018 (UKCP18) (**Ref. 6-28**) provide data on projected change in climate variables for the UK. Probabilistic projections for the 25km^2 grid square (337500.00, 362500.00) where the Proposed Development is located have been used (see **Figure 6-1** below).

Figure 6-1: 25km^2 Grid Square used for Probabilistic Projections



6.10.15. The UKCP18 datasets are the most up-to-date projections of climate change for the UK, providing projections until the end of the twenty-first century. UKCP18 includes probabilistic projections of a range of climate variables for different emissions scenarios, termed representative concentration pathways (RCP) and for a range of time slices to the end of the century. The central estimate

projections (50th percentile) are presented against baseline levels of 1981-2010s.

6.10.16. RCP8.5 is a high emissions' scenario which combines assumptions about high population and relatively slow income growth with modest rates of technological change and energy intensity improvements.

6.10.17. The future baseline has been presented for the 2020s (2010-2039), the 2050s (2040-2069) and 2070s (2060-2089) to identify the anticipated climate conditions over the construction and life of the Proposed Development's key components:

- Construction compound: live for the duration of the construction period of approximately 18 months.
- Proposed Development: anticipated design life of 40 years (2025-2065).

Precipitation

6.10.18. Climate change is projected to lead to wetter winters and drier summers although natural variation, including extreme events such as storms and heatwaves, will continue to punctuate these trends. The projected changes to average summer and winter rainfall for the 2020s, 2050s and 2070s are summarised in **Table 6-7**.

Table 6-7: Projected Change in Mean Summer and Winter Precipitation (%) for the 2020s, 2050s and 2080s, RCP8.5

Season	Time slice, precipitation change (%)		
	2020s	**2050s**	**2070s**
Summer	-5.0%	-19.4%	-27.0%
Winter	+1.4%	+6.4%	+10.8%

6.10.19. The central estimate (50th percentile) predicts that there will be a decrease in summer rainfall for all of the time slices, with a decrease of up to 27% by the 2070s. In contrast, winter precipitation is predicted to increase by 6.4% for the 2050s and 10.8% for the 2070s.

Extreme Precipitation

6.10.20. Climate change means that more rainfall will fall during 'intense' events, particularly in winter. Intense rainfall is considered where days of rainfall exceed >10mm.

6.10.21. Projections for projected change in extreme precipitation are only available at the 2.2km scale from UKCP18 for the time periods of 2021-2040 and 2061-2080 as presented in **Table 6-8**.

Table 6-8: Projected Change in Mean Extreme Summer and Winter Precipitation (%) in the UK for the 2030s and 2070s, RCP8.5

Season	Time slice, precipitation change (%)	
	2021-2040	**2061-2080**
Summer	-7%	-33%
Winter	+9%	+26%

6.10.22. **Table 6-8** shows that the summer months will experience a decrease in intense rainfall whilst the winter months will face an increase in extreme weather.

Snow and Ice

6.10.23. With regards to future changes, rising winter temperatures are likely to reduce the amount of precipitation that falls as snow in winter. UKCP18 does not have data on snowfall, although UKCP09 (the climate projections preceding UKCP18) projects a reduction of mean snowfall, the number of days when snow falls and heavy snow events by the end of the twenty-first century. UKCP09 projections indicate substantial reductions in snowfall days for all regions in winter (**Ref. 6-29**).

Temperature

6.10.24. In general, UKCP18 predicts that climate change is projected to lead to hotter summers and warmer winters. **Table 6-9** summarises the UKCP18 projections for changes in mean temperature for the 25km grid square where the Proposed Development is located in the 2020s, 2050s and 2070s under RCP 8.5.

Table 6-9: Projected Change in Mean Summer and Winter Temperature (°C) for the 2020s, 2050s and 2070s RCP8.5

Season	Time slice, temperature change (0C)		
	2020s	**2050s**	**2070s**
Summer	+0.8°C	+1.9°C	+3.2°C
Winter	+0.6°C	+1.6°C	+2.4°C

6.10.25. The central estimate (50th Percentile) predicts that there will be an increase in summer temperature by approximately 0.8°C for the 2020s, 1.9°C for the 2050s and 3.2°C for the 2070s. Winter temperature is also predicted to increase, by 0.6°C for the 2020s, 1.6°C for the 2050s and 2.4°C for the 2070s.

Extreme Temperature

6.10.26. **Table 6-10** summarises the UKCP18 projections for changes in maximum and minimum temperature for the 25km grid square in which the Proposed

Development is located, for summer and winter in the 2020s, 2050s and 2070s under RCP8.5. Note, the values below represent mean maximum and minimum temperature changes. Therefore, individual days may exceed these values.

Table 6-10: Projected Change in Maximum and Minimum Mean Summer and Winter Temperatures (°C) for the 2020s, 2050s and 2070s under RCP8.5 for the Proposed Development Area

Season	Time slice, temperature change (0C)					
	2020s		2050s		2070s	
	Max	Min	Max	Min	Max	Min
Summer	1.0	0.7	2.2	1.7	3.6	2.9
Winter	0.6	0.6	1.5	1.6	2.3	2.4

Relative Humidity

6.10.27. Projections for humidity anticipate an increase in summer and winter humidity of 15% and 17% by 2070, respectively, as outlined in **Table 6-11**.

Table 6-11: Projected Change in Mean Summer and Winter Relative Humidity (%) for the 2050s and 2070s under RCP8.5 for the Proposed Development Area

Season	Time slice, precipitation change (%)		
	2020s	2050s	2070s
Summer	+ 4.0%	+ 9.3%	+ 14.6%
Winter	+ 4.1%	+ 10.5%	+ 16.9%

Wind

6.10.28. UKCP18 depicts a wide spread of future changes in mean surface wind speed, however, there is large uncertainty in projected changes in circulation over the UK and natural climate variability contributes much of this uncertainty (**Ref. 6-30**). It is therefore difficult to represent regional wind extreme winds and gusts within regional climate models (**Ref. 6-31**).

6.10.29. Central estimates of change in mean wind speed for the 2050s are small in all ensemble runs (<0.2m/s). A wind speed of 0.2m/s (approximately 0.4 knots) is small compared with the typical magnitude of summer mean wind speed of about 3.6–5.1m/s (7 – 10 knots) over much of England (**Ref. 6-32**). Seasonal changes at individual locations across the UK lie within the range of –15% to +10%.

6.10.30. In terms of storms, the analysis presented here is a summary of expected changes in storm patterns under a changing climate. A storm is defined by the Met Office as a wind event measuring 10 or higher on the Beaufort scale (equivalent to a wind speed of 24.5m/s or 55mph) (**Ref. 6-33**).

6.10.31. Studies (**Ref. 6-34 and Ref. 6-35**) relating to future projections of storms suggest that climate-driven storm changes are less distinct in the northern than southern hemisphere. However, such is the wide range of inter-model variation, robust projections of changes in storm track are not yet possible and there is low confidence in the direction of future changes in the frequency, duration or intensity of storms affecting the UK.

Sea Level

6.10.32. Projections for sea level rise have been ascertained using UKCP18 marine projections for the closest location to the Proposed Development area (see **Figure 6-2** below) as presented in **Table 6-12**. By 2050, the area could experience sea level rise in the region of 24cm, posing flood risk to the Proposed Development.

Figure 6-2: Grid Square used for Marine Projections

Table 6-12: Projected Change in Sea Level Rise (mm) for the 2020s, 2050s and 2070s RCP8.5

	Time slice		
	2020s	**2050s**	**2070s**
Sea level increase (m)	+0.08m	+0.24m	+0.39m

6.11. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION

6.11.1. The DCO will be undertaken in accordance with the construction environmental management plan (CEMP) containing a Register of Environmental Actions and Commitments (REAC) for the application, will be prepared for the Proposed Development before construction. This plan will detail the environmental controls, environmental protection measures and safety procedures that will be adopted during the construction.

6.11.2. To preclude the potential for significant adverse environmental effects during construction of the Proposed Development, and hence prevent the need for further assessment, the mitigation measures in **Table 6-13** shall be included in the REAC and implemented through the CEMP.

Table 6-13: Climate Resilience Measures to be included within the CEMP

Climate variable	Climate risk at the construction stage	Mitigation to be included in the CEMP
Temperature	Risk to the health of site workers from both hot and cold conditions Overheating of plant and equipment	Ensuring welfare facilities are cooled during summer and warmed during winter. Providing adequate rest, shade and Personal Protective Equipment (PPE) – such as hats, sun cream and drinking water – for workforce during periods of high temperature. Coach workers on appropriate clothing to avoid frostbite and hypothermia, prepare site properly to avoid slips and falls, check vehicle fluids and inspect

Climate variable	Climate risk at the construction stage	Mitigation to be included in the CEMP
		equipment, set up warming stations for workforce during periods of freezing temperature. Switching off machinery when not in use.
Precipitation	Overwhelming of drainage infrastructure Waterlogging of materials Disruption to site access and delays to the construction process as a result of flooding	Ensuring construction compound drainage has sufficient capacity to cope with heavy rainfall events and that silt traps are in use/regularly emptied. Sealing spoil heaps and stockpiles shortly after excavation and formation. Minimising the material stockpiled by either using as soon as possible or removing from Site, if reuse is not an option. Where material is stockpiled on Site, this would be regularly inspected during and following extreme weather events (e.g. floods, heatwaves and storms). Ensuring access roads used during construction are monitored, especially during periods of heavy rainfall and appropriate traffic management put in place to avoid areas of potential flooding. Local advice from the council or traffic authority regarding traffic management measures that may be required during times of extreme weather would be taken and implemented.
Wind and storms	Risk to the safety of site workers Risk to the safety of the surrounding environment Loss of materials	Adjusting the programme of activities and reviewing wind speed before commencing any work at height. Ensuring all site fencing and structures are properly secured. Covering spoil and material heaps during periods of high rainfall or high winds.

Climate variable	Climate risk at the construction stage	Mitigation to be included in the CEMP
	Increase in dust emissions	Adopting dust control measures.
Sea level rise	N/A. Sea level rise is not considered to be a risk to the short-term construction period.	

OPERATION

6.11.3. It is anticipated that the following measures would be incorporated into the Proposed Development design to ensure its resilience to a changing climate. These measures would be implemented and secured as part of the Onshore and Marine Outline CEMPs. These measures will be explored in further detail and confirmed at the detailed design stage through consultation with the relevant designers and engineers:

- Consider projections of extreme temperature (using weather forecasting services) when specifying materials to ensure high temperatures do not result in deterioration of materials. Re-consider choice of materials when repair or replacement is necessary;
- Regular inspection of infrastructure, materials and structures to identify any deterioration following extreme weather events (e.g. floods, heatwaves, drought, storm). Bring forward repair/replacement if necessary; and
- The contractor would also register with the Environment Agency's Floodline Warning Direct service and the Met Office weather warnings. The contractor would consider the potential risks associated with extreme weather to inform programme management and impact mitigation measures.

6.12. DESCRIPTION OF LIKELY SIGNIFICANT EFFECTS

6.12.1. The EIA Guide to Climate Change Resilience and Adaptation outlines that the scoping stage should identify the key climatic variables relevant to the Proposed Development and likely effects; however, it is not prescriptive in how this is undertaken.

6.12.2. Furthermore, climate change in-combination with other environmental effects of the Proposed Development includes the potential for climate change to exacerbate or ameliorate the potential effects identified within each of the environmental topics. The in-combination climate impacts will be assessed as part of the ES.

IDENTIFYING VULNERABLE PROPOSED DEVELOPMENT ELEMENTS

6.12.3. In order to identify the vulnerable Proposed Development elements, a sensitivity and exposure assessment has been undertaken.

6.12.4. The vulnerability of receptors to climate variables is considered to be a function of sensitivity and exposure, using the matrix shown in **Table 6-14** and as described below:

- The typical sensitivity of receptors to climate variables – based on literature review and expert judgement and rated as high, medium or low; and
- The exposure of receptors to projected change in climate variables – based on the baseline information presented above and rated as high, medium or low.

Table 6-14: Vulnerability Matrix

Sensitivity	Exposure		
	Low	**Medium**	**High**
Low	Low vulnerability	Low vulnerability	Low vulnerability
Moderate	Low vulnerability	Medium vulnerability	Medium vulnerability
High	Low vulnerability	Medium vulnerability	High vulnerability

6.12.5. On completion of the vulnerability assessment, climate variables in the construction and operation phase to which the Proposed Development is likely to have a Low vulnerability to are scoped out of further assessment. Climate variables in the construction and operation phase to which the Proposed Development is likely to have a medium or high vulnerability to are taken forward for further assessment at the next stage. This is a qualitative assessment informed by expert opinion and supporting literature.

SENSITIVE RECEPTORS/RESOURCES

6.12.6. In the case of climate resilience, the sensitive receptors considered within the EIA include:

Construction

- The construction site (including access road and temporary buildings such as offices);
- Workers;
- Materials; and

- Plant and equipment (including ancillary features such as security fencing, drainage, freshwater supply and lighting).

6.12.7. The construction site would be sensitive to extreme weather such as heavy rainfall events and heatwaves. Heavy precipitation may lead to flash floods and waterlogging on the construction site, compromising any materials contained on site. This could be particularly disruptive during open trenching.

6.12.8. Heatwave conditions or freezing temperatures/snow may pose health risks to site workers and could disrupt the operation of plant and machinery. Structures would be sensitive to storms and heavy winds, also posing risks to workers. Such weather events may lead to delays in the construction process.

Operation

- Carbon dioxide pipeline (various sites and diameters); and
- Above ground installations (AGIs) including BVS.

6.12.9. **Precipitation** – the Proposed Development would be sensitive to high and low rainfall. Drying out and cracking of materials may affect structural stability and composition of the carbon dioxide pipeline. Prolonged dry periods can lead to cracking and more rapid deterioration of materials. Pluvial and fluvial flooding or high ground water levels may also cause pollutants in the soil to be mobilised, potentially affecting materials. Snow and ice can cause damage to above-ground infrastructure, including roofs and damage

6.12.10. **Temperature -** the Proposed Development would be sensitive to high and low temperatures through:

- Overheating of infrastructure, leading to greater demand for cooling;
- Overheating of electronic equipment;
- Increased pressure on compression, dehydration, and oxygen removal;
- Safety risks from overheating;
- Deterioration of material structure and fabric;
- Damage to paved surfaces, including potential melting and deformation; and
- Security infrastructure and lighting may fail in heatwave conditions.

6.12.11. **Wind and storms -** high wind speeds and gusts may have impacts on the Proposed Development. It is important to note that whilst the short-term consequences of wind-related disruption are large, repairs may usually be carried out quickly. High winds and storms can affect the stability of above-ground infrastructure and hasten material degradation. High winds can also cause wind-driven rain infiltration into plant, building materials and surfaces which can increase maintenance costs and operational disruption.

6.12.12. Lightning strike can cause fire as well as power surges and shock waves which can destabilise energy systems, as well as causing damage to electronic and ICT equipment, including substations.

6.12.13. **Relative humidity -** An increase in humidity can increase condensation, mould growth, mildew, staining and the corrosion and decay of metal surfaces, as well as poor performance of insulation.

6.12.14. **Sea level rise** - infrastructure is sensitive to changes in sea level, particularly electrical substations and supporting infrastructure. Sea level rise caused by climate change could increase the risk of tidal flooding over the lifetime of the Proposed Development. Coastal flooding due to sea level rise or storm surge can directly cause damage to energy infrastructure such as cables, cable joints and the transition joint bay as well as potentially reducing earthwork stability and hastening the deterioration of materials. Flood risk may also depend strongly on the design of the new infrastructure as well as its siting. Power outages and threats to business continuity are the main risks associated with sea level rise and storm surge.

6.12.15. Based on the information described above, literature review and expert opinion, **Table 6-15** outlines the climate sensitivity of the Proposed Development's main components. The sensitivity assessment has taken into account the measures identified for inclusion in the CEMP however measures identified during operation will need to be confirmed in further detail at the design stage and hence have not been included in the sensitivity assessment at this stage.

Table 6-15: Sensitivity Assessment

Climate Variables		Sensitivity of Proposed Development components			
		Construction		Operation	
		Construction site	Construction workers	Carbon dioxide pipeline	AGIs (including BVS)
Precipitation	Change in annual average	Low	Low	Low	Moderate
	Drought	Low	Low	Moderate	Moderate

Climate Variables		Sensitivity of Proposed Development components			
		Construction		Operation	
		Construction site	Construction workers	Carbon dioxide pipeline	AGIs (including BVS)
	Extreme precipitation events	Low	Low	High	High
Temperature	Change in annual average	Low	Low	Low	Moderate
	Extreme temperature events	Low	Low	High	High
Wind	Gales and high winds	Low	Low	Low	Moderate
	Storms	Low	Low	Low	Moderate
Relative humidity	Changes in annual average	Low	Low	Low	Low
	Evaporation	Low	Low	Low	Low
Sea level	Sea level rise	Low	Low	Moderate	Moderate
	Storm surge and storm tide	Low	Low	Low	Low

EXPOSURE

6.12.16. Based on the baseline climate and climate change information presented in Section 6.10, **Table 6-16** summarises the exposure of the Proposed Development elements to change in climate variables. Exposure is the nature sand degree to which the Proposed Development will be exposed to significant climate variations.

Table 6-16: Exposure Assessment

Climate Variable		Exposure: 2024/25 Construction phase	Exposure: 2025 onwards Operation phase
Precipitation	Change in annual average	Low	Medium
	Drought	Low	Low
	Extreme precipitation events (flooding)	Medium	High
Temperature	Changes in annual average	Low	Medium
	Extreme temperature events	Medium	Medium
Wind	Gales and extreme wind events	Medium	Medium
	Storms (hail, lightning)	Medium	Medium
Relative humidity	Changes in annual average	Low	Low
	Evaporation	Low	Low
Sea Level	Sea level rise	Low	Medium
	Storm surge and storm tide	Low	Low

VULNERABILITY

6.12.17. In this context, vulnerability is the degree to which components of the Proposed Development are susceptible to, and unable to cope with, the adverse effects of climate change The vulnerability of receptors (**Table 6-17**) to climate variables has been determined from the combination of the sensitivity (**Table 6-15**) and exposure ratings (**Table 6-16**) using the vulnerability matrix set out in **Table 6-14**.

Table 6-17: Vulnerability Assessment

Receptor	Variable		Sensitivity (Table 6-15)	Exposure[1] (Table 6-16)	Vulnerability
Construction site **Construction workers**	Precipitation	Change in annual average Drought	Low	Low	Low vulnerability
		Extreme precipitation events	Low	Medium	Low vulnerability
	Temperature	Change in annual average	Low	Low	Low vulnerability
		Extreme temperature events	Low	Medium	Low vulnerability
	Wind	Gales and extreme wind events Storms (snow, lightning, hail)	Low	Medium	Low vulnerability
	Relative humidity	Changes in annual average Evaporation	Low	Low	Low vulnerability
	Sea level	Sea level rise Storm surge and storm tide	Low	Low	Low vulnerability
Carbon dioxide pipeline	Precipitation	Change in annual average	Low	Medium	Low vulnerability
		Drought	Moderate	Low	Low vulnerability
		Extreme precipitation events	High	High	High vulnerability
	Temperature	Change in annual average	Low	Medium	Low vulnerability
		Extreme temperature events	High	Medium	Medium vulnerability
	Wind	Gales and extreme wind events	Low	Medium	Low vulnerability
		Storms (snow, lightning, hail)	Low	Medium	Low vulnerability
	Relative humidity	Changes in annual average Evaporation	Low	Low	Low vulnerability

[1] The exposure assessment for construction site and construction workers is taken form the 2020s exposure assessment (**Table 6-12**) due to the anticipated construction date. All other receptor exposures assessments are taken from the 2060s and 2080s exposure assessment due to the anticipated operational design life.

Receptor	Variable		Sensitivity (Table 6-15)	Exposure[1] (Table 6-16)	Vulnerability
	Sea level	Sea level rise	Moderate	Medium	Medium vulnerability
		Storm surge and storm tide	Low	Low	Low vulnerability
AGIs (including BVS)	Precipitation	Change in annual average	Moderate	Medium	Medium vulnerability
		Drought	Moderate	Low	Low vulnerability
		Extreme precipitation events	High	High	High vulnerability
	Temperature	Change in annual average	Moderate	Medium	Medium vulnerability
		Extreme temperature events	High	Medium	Medium vulnerability
	Wind	Gales and high winds Storms	Moderate	Medium	Medium vulnerability
	Relative humidity	Changes in annual average Evaporation	Low	Low	Low vulnerability
	Sea level	Sea level rise	Moderate	Medium	Medium vulnerability
		Storm surge and storm tide	Low	Low	Low vulnerability

6.12.18. Following the vulnerability assessment, the receptors deemed low vulnerability have been scoped out of further assessment. The receptors deemed medium or high vulnerability have been scoped into further assessment in the ES.

Table 6-18: Elements Scoped in or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Construction site **Construction workers**	Construction		✔	Low vulnerability following the inclusion of measures within the CEMP to reduce potential impacts during the temporary and short-term nature of the construction phase.
Carbon dioxide pipeline Extreme precipitation events / Extreme temperature events / Sea level rise	Operation	✔		Medium or high vulnerability in **Table 6-14**
Carbon dioxide pipeline Change in annual average precipitation and temperature / Drought / Wind / Humidity / Storm surge and storm tide	Operation		✔	Low vulnerability in **Table 6-14**
AGIs (including BVS) Change in annual average precipitation and temperature / Extreme precipitation events / Extreme temperature events / Wind / Sea level rise	Operation	✔		Medium or high vulnerability in **Table 6-14**
AGIs (including BVS) Drought Relative Humidity	Operation		✔	Low vulnerability in **Table 6-14**

Element	Phase	Scoped In	Scoped Out	Justification
Storm surge and storm tide				

6.13. OPPORTUNITIES FOR ENHANCING THE ENVIRONMENT

6.13.1. The ES will explore opportunities for enhancing the Proposed Development's resilience to climate change such as through selection and durability of materials and establishment of inspection regimes.

6.14. PROPOSED ASSESSMENT METHODOLOGY

6.14.1. The climate resilience assessment is compliant with EN-1 section 4.8 'climate change adaptation' specifically 4.8.5 which outlines that '*new energy infrastructure will need to remain operational over many decades, in the face of a changing climate. Consequently, applicants must consider the impacts of climate change when planning the location, design, build, operation and, where appropriate, decommissioning of new energy infrastructure*.' In addition, the scoping report has utilised the latest UK climate projections and adaptation measures will be explored further at the ES stage following a detailed assessment.

6.14.2. The climate resilience assessment is compliant with EN-4 section 2.2 'climate change adaptation' specifically 2.2.2 which identifies risks to infrastructure as a result of climate change. These risks have been identified in the scoping chapter and will be explored further at the ES stage.

6.14.3. The assessment at the ES stage will be undertaken line using an approach based on the IEMA guidance and professional judgement.

6.14.4. In the ES the significance of effects of changes in (scoped in) climate variables on receptors will be determined by considering the consequence and the likelihood of potential impacts associated with changes in climate variables on receptors occurring.

SIGNIFICANCE CRITERIA

6.14.5. The likelihood and consequence will be combined to assess the significance of effects on receptors, as shown in **Table 6-19,** which is based on DMRB (Ref 6-36), IEMA (Ref 6-10) and professional judgement. The assessment is qualitative and based on expert judgment based on knowledge of similar developments, engagement with the wider Project Team and a review of relevant literature.

Table 6-19: Significance Rating Matrix

Likelihood	Consequence of hazard occurring				
	Negligible	**Minor Adverse**	**Moderate Adverse**	**Large Adverse**	**Very Large Adverse**
Very High	Not significant	Significant	Significant	Significant	Significant
High	Not significant	Significant	Significant	Significant	Significant
Medium	Not significant	Not significant	Significant	Significant	Significant
Low	Not significant	Not significant	Not significant	Significant	Significant
Very Low	Not significant	Not significant	Not significant	Significant	Significant

6.15. LIMITATIONS AND ASSUMPTIONS

6.15.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- The assessment has been based on Proposed Development information available at the time of writing the scoping chapter.
- The in-combination climate impacts will be assessed at ES stage.
- The UKCP18 projections have been used to infer future changes in a range of climate variables that may affect the vulnerability of the Proposed Development to climate change. At the time of writing, these represent the most up-to-date representation of future climate in the UK. However, the UKCP18 data currently available does not provide data for extreme precipitation, drought, snow and ice or wind.
- There are inherent uncertainties associated with climate projections and they are not predictions of the future. It is possible that future climate will differ from the future baseline climate against which the resilience of the Proposed Development has been assessed, depending on global emissions over the next century. A ‘high’ emissions scenario (RCP 8.5) using the 2070s time slice (2060 – 2089 - the longest temporal scale available through UKCP18) has been used to develop the baseline against which resilience has been assessed. This is consistent with the precautionary principle (i.e. ‘worst case’ scenario).

- Any further research, analysis or decision-making should take account of the accuracies and uncertainties associated with climate projections. It is also important to note that the analysis is based on selected observational data, the results of climate model ensembles and a selected range of existing climate change research and literature available at the time of assessment. Any future decision-making based on this analysis should consider the range of literature, evidence and research available at that time and any changes to this.

6.16. REFERENCES

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CLIMATE RESILIENCE

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7. CULTURAL HERITAGE

7.1. INTRODUCTION

7.1.1. This Chapter considers the impact of the Proposed Development on cultural heritage during construction and operation, and any potential significant effects. It sets out the proposed methodology for the cultural heritage assessment and identifies those impacts that can be scoped out of the Environmental Impact Assessment (EIA).

7.2. STUDY AREA

7.2.1. The main Study Area will comprise a 500m buffer around the Newbuild Infrastructure Scoping Boundary, to identify and assess the potential for buried heritage assets (i.e. archaeological remains) within the Proposed Development. Based on professional judgement and experience of other similar developments, it is anticipated that this will provide an adequate data set to inform the baseline and allow for an accurate prediction of the likelihood for currently unknown below ground archaeological remains within the Site.

7.2.2. The Study Area will be extended to a 1km buffer of the Newbuild Infrastructure Scoping Boundary at the confirmed locations of the above ground installations (AGIs), block valves and any other above ground structures required, in order to identify any cultural heritage assets that could be impacted by the Proposed Development through a change in setting. The size of the study area for settings assessment will be reviewed and refined following a review of a Zone of Theoretical Visibility (ZTV) that will be produced during the collection of the baseline data for the assessment.

7.2.3. It is not judged appropriate to apply the 1km Study Area to the carbon dioxide pipeline sections as these will be below ground features and will not be visible during operation.

7.2.4. It is not currently proposed to extend the Study Areas up to 1km around any construction site compounds, due to their temporary nature, although the requirement for this will be reviewed as the design of the Proposed Development emerges.

7.3. BASELINE CONDITIONS

7.3.1. The following data sources have been used to inform the historic environment baseline, and to provide an initial indication of the likely key issues for the assessment:

- Cadw and Historic England databases: statutory Designated Heritage Assets (World Heritage Sites (including buffers), scheduled monuments,

listed buildings, registered parks and gardens and registered battlefields); and

- Historic Environment Data: Clwyd-Powys Archaeological Trust (CPAT HER) and Cheshire Archaeology Planning Advisory Service (CHER): Non-Designated Heritage Assets, Conservation Areas and previous archaeological investigations.

7.3.2. A total of 82 designated heritage assets are present within 500m of the Newbuild Infrastructure Scoping Boundary, comprising seven scheduled monuments, 68 listed buildings, six conservation areas and one historic landscape. Of these, five designated heritage assets lie within the Newbuild Infrastructure Scoping Boundary. They comprise:

- Scheduled Monument Moated Site, Fishpond and Connecting Channel, Elton (National Heritage List Entry No (NHLE). 1012122);
- Grade II Listed Building Ferry Bank Farm (Record Number 85249);
- Thornton-le-Moors Conservation Area;
- Chester Canal Conservation Area; and
- Hollywell Common and Halkyn Mountain.

7.3.3. There are 51 non-designated heritage assets within the Newbuild Infrastructure Scoping Boundary identified: They comprise:

- Roman Road (Chester to Wirral) (CHER 2010/1/0)
- King's Wood Lane/Saltersway/Military Way possible Roman/Medieval road (CHER 2030/1)
- Shotwick Park Medieval deer park (CHER 2016/1/0)
- ROF Dunham on the Hill (CHER 4217),
- Royal Observer Corps Monitoring Post at Saughall (CHER 4135/0/2).
- RAF Hawarden wireless station (CPAT HER 129638, CPAT HER 129643, CPAT HER 129646 and CPAT HER 129647)
- Sealand Embankment V flood defence (CPAT HER 34239).
- Higher Shotton Settlement (CPAT HER 105942)
- Nant y Felyn post medieval mill leat (CPAT HER 89483)
- Queensferry Shipyard II (CPAT HER 83030), Chemical Works (CPAT HER 103918) and Chapel (CPAT HER 83034).
- Fuel Depot in Chorlton-by-Backford (CHER 4233)
- Aston Quay (CPAT HER 83031, CPAT HER 83032, CPAT HER 83033, CPAT HER 83054, CPAT HER 34240, CPAT HER 122614 and CPAT HER 34255)

- Mancot Colliery Tramway (CPAT HER 37792) and Mancot Tramway Pier (CPAT HER 85036)
- Mancot Royal strip field system (CPAT HER 99060)
- Sandycroft boundary stone (CPAT HER 103807)
- Five railway lines (CHER 2468/1/0, CHER 2527/1/0, CPAT HER 99043, CPAT HER 23603 and CPAT HER 83035).
- Three areas of Medieval and Post-medieval Ridge and Furrow (CHER 05/01/2016, CHER 15191 and CPAT HER 97837)
- Sand pit (CPAT HER 85032).
- Four marl pits (CPAT HER 85035, CPAT HER 85036, CPAT HER 85009 and CPAT HER 85013)
- Four coal mines/colliery sites (CPAT HER 37870, CPAT HER 99047, CPAT HER 103806 and CPAT HER 119887)
- Brickworks (CPAT HER 103787) and clay pit (CPAT HER 99035)
- Three air crash sites (HER 130407, HER 130270 and HER 130305)
- Findspots of post-medieval objects (HER 7787 and HER 7788)

7.3.4. There are no World Heritage Sites, registered battlefields or registered parks and gardens within 500m of the Newbuild Infrastructure Scoping Boundary.

ABOVE GROUND DESIGNATED HERITAGE ASSETS AT THE INDICATIVE AGI SITES AND BLOCK VALVE STATIONS

Indicative AGI Sites

7.3.5. There are no above ground designated heritage within 1km the Grinsome Road AGI.

7.3.6. Within 1km of the Alcohols Site AGI there is:

- Scheduled monument Moated Fishpond and Connecting Channel, Elton (NHLE 1012122)
- Grade I listed Church of St Mary (NHLE 1330242)
- Eight Grade II listed buildings:
  - Yew Tree House (NHLE 1130651),
  - Glebe Farmhouse (NHLE 1130652),
  - Thornton Hall (NHLE 1130653),
  - Barn To North East Of Thornton Hall (NHLE 1130654),
  - Retaining Wall Bounding Churchyard Of St Mary's Church On West, South And Half On East Side Including Gate Piers At South West Corner (NHLE 1130655),

  - Table Tomb To John Davies Of Dunham, South East Of Church Of St Mary (NHLE 1145887),
  - Church House Farmhouse Including Shippon Abutting On North (NHLE 1330240),
  - Church Farmhouse Including Cottage Wing To West (NHLE 1330241), and
  - Building 50 At Thornton Aero Engine Research Laboratory (NHLE 1392326).
- Thornton-le-Moors Conservation Area

7.3.7. There are three indicative locations for the Flint AGI. Within 1km of all three, there are:

- Three scheduled monuments:
  - Croes Atti Roman Site (Record Number FL213),
  - Pentre Bridge Roman Site (Record Number FL131), and
  - Bryn y Cwm Mound & Bailey Castle (Record Number FL064).
- Three Grade II listed buildings,
  - Leadbrook Hall (Record Number 16409),
  - Oakenholt Hall (Record Number 355) and
  - Oakenholt Farmhouse (Record Number 521)
- Oakenholt Conservation Area.

Block Valve Stations (BVS)

7.3.8. There are no designated heritage assets are located within 1km of the Coed-y-Cra BVS.

7.3.9. Within 1km of the Cornist Lane BVS there are:

- Two scheduled monuments:
  - Hafod Wood Moated Site (Record Number FL179); and
  - Hen Blas Castle Site (Record Number FL062)
- Grade II listed building Hafod Farmhouse (Record Number 26192).

7.3.10. Within 1km of the Pentre Halkyn BVS there are:

- Two scheduled monuments;
  - Bryn y Cosyn Round Barrows (Record Number FL096); and
  - Two Round Barrows 90m NE of Eosfan (Record Number FL046).
- Grade II* listed building Llwyn-erddyn (Record Number 350);

- Two Grade II listed buildings;
  - Stable block and pigeon house at Plas Coch (Record Number 24668); and
  - Cart house, smithy and pigsties at Plas Coch (Record Number 24669).
- Hollywell Common and Halkyn Mountain Historic Landscape

7.3.11. Within 1km of the Babell BVS there are:

- Five scheduled monuments;
  - Enclosure, Field System & Hollow-ways North of Pant (Record Number FL163);
  - Hen Caerwys Deserted Village Site (Record Number FL162);
  - Llyn Du Round Barrow (Record Number FL189);
  - Offa's Dyke:Section N & S of the Circle on Holywell Racecourse, and Circle and Round Barrow (Record Number FL006);and
  - Round Barrow 225m SE of Plas Newydd (Record Number FL076).
- Grade II* listed building Barn at Gellilyfdy (Record Number 24676);
- Four Grade II listed buildings;
  - Plas-newydd (Record Number 24687);
  - Gellilyfdy (Record Number 14880)
  - Bakehouse at Gellilyfdy (Record Number 24674) and
  - Stable at Gellilyfdy (Record Number 24675).

7.4. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

7.4.1. Mitigation measures will be developed as part of the design process and will be informed by the assessment. An appropriate mitigation strategy will aim to reduce or offset any significant adverse effects on the cultural heritage assets that are identified. Measures identified within the mitigation strategy will normally consist of design adjustments, or of investigation and recording, undertaken in accordance to the standards and guidance from Cadw (**Ref. 7-1**, **Ref. 7-2**) Historic England (**Ref. 7-3**, **Ref. 7-4**, **Ref. 7-5**, **Ref. 7-6**, **Ref. 7-7** and **Ref. 7-8**) and the Chartered Institute for Archaeologists (CIfA) (Chartered Institute for Archaeologists (**Ref. 7-9** and **Ref. 7-10**).

7.4.2. All mitigation proposed will be proportionate to the significance of the effect identified and the sensitivity of the asset affected.

7.5. DESCRIPTION OF LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

7.5.1. During construction, any activities that require ground disturbance, such as preliminary ground works, topsoil removal for easement corridor, pipe trench excavation, diversion of existing utilities and establishment of laydown areas and temporary works compounds, could impact on known or possible below ground heritage assets and palaeoenvironmental deposits. Any impacts would be permanent and irreversible, potentially resulting in significant effects, depending on the value of the heritage asset impacted.

7.5.2. There is also the potential for impacts on heritage assets (designated and non-designated) and historic landscapes through temporary changes in setting as a result of construction activity, including temporary visual intrusion; an increase in noise, lighting and vibration from construction related vehicles, or an increase in dust and pollution. Impacts would result in changes in the landscape around the asset, which could reduce the contribution of the setting to the value of the asset. This could result in a significant effect on assets where the setting contributes to their value.

7.5.3. There is a potential for impacts on historic landscapes (including hedgerows) during the construction phase, due to the change in landscape character. There is the potential for permanent impacts on historic landscape from the AGIs as the character will be permanently altered. Any impacts on historic landscapes along the carbon dioxide pipeline route are anticipated to be temporary as the land will be returned to its original use after construction.

7.5.4. No direct physical impacts on below ground cultural heritage assets are anticipated during the construction of the BVS as they are located within the Flint-PoA Pipeline as it is assumed any present were removed during its original construction.

OPERATION PHASE

7.5.5. There is a potential for impacts on the setting of the heritage assets and historic landscapes (designated and non-designated) around the location of the AGIs and BVS during operation. Impacts would result from a change in the landscape around the relevant asset, which could reduce the contribution of the setting to its value. Impacts could arise from the visual intrusion of the Proposed Development, which would change views towards and away from the asset. Impacts could also occur from a perceptible change in noise and lighting, which would change the way the asset is experienced. The impacts could be either adverse or beneficial, depending on the heritage asset, its location, the contribution of the setting to the value of the asset. There is a potential, therefore, for the operation of the Proposed Development to result in a significant effect (both adverse and beneficial) on the setting of heritage assets.

7.5.6. No significant effects are anticipated on the setting of heritage assets and historic landscapes during operation of the carbon dioxide pipeline as it will be below ground and not visible from the surface, therefore resulting in no permanent change to the setting.

7.5.7. No significant effects are anticipated on below-ground heritage assets in the operation phase as the impacts would occur in the construction phase.

Table 7-1: Elements Scoped in or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Cultural heritage impacts arising from Existing Pipeline Works (excluding BVS)	Construction Operation		✔	No physical works as part of this Application. Therefore, no impact pathways relevant to cultural heritage.
World Heritage Sites, Registered Parks and Gardens, Registered Battlefields	Construction and Operation		✔	No World Heritage Sites, Registered Parks and Gardens, Registered Battlefields are within the Newbuild Infrastructure Scoping Boundary and therefore none will be directly physically impacted by the Proposed Development. None are located within 2km of the Newbuild Infrastructure Scoping Boundary and therefore no therefore no impacts on settings during construction or operation.
Scheduled Monument Moated Site, Fishpond and Connecting Channel, Elton (National Heritage List Entry No. 1012122)	Construction and Operation	✔		Potential for direct physical impacts based on route alignment. Potential for temporary impacts on the setting due to construction activity. Potential for permanent impacts on setting with the introduction of the Alcohols Site AGI.
Scheduled Monument Croes Atti Roman Site (Record Number FL213)	Construction and Operation	✔		Potential for temporary impacts on the setting due to construction activity. Potential for permanent impacts on setting with the introduction of the Flint AGI.
Scheduled Monument Pentre Bridge Roman Site (Record Number FL131)	Construction and Operation	✔		Potential for temporary impacts on the setting due to construction activity. Potential for permanent impacts on setting with the introduction of the Flint AGI.
Scheduled Monument Bryn y Cwm Mound & Bailey Castle (Record Number FL064).	Construction and Operation	✔		Potential for temporary impacts on the setting due to construction activity. Potential for permanent impacts on setting with the introduction of the Flint AGI.
Grade I Listed Church of St Mary (NHLE 1330242) and Eight Grade II Listed Buildings contained within the Thornton-le-Moors Conservation Area	Construction and Operation	✔		Potential for temporary impacts on the setting due to construction activity. Potential for permanent impacts on setting with the introduction of the Alcohols Site AGI.
Grade II Listed Building Ferry Bank Farm (Record Number 85249)	Construction	✔		Potential for direct physical impacts based on route alignment. Potential for temporary impacts on the setting due to construction activity.
	Operation		✔	Any potential for direct physical impacts based on route alignment will be incurred during the construction phase only. No change in setting during operation.
Grade II Listed Buildings Oakenholt Hall (Record Number 355), Oakenholt Farmhouse (Record	Construction and Operation	✔		Potential for temporary impacts on the setting due to construction activity. Potential for permanent impacts on setting with the introduction of the Flint AGI.

Element	Phase	Scoped In	Scoped Out	Justification
Number 521), and Leadbrook Hall (Record Number 16409) and Oakenholt Conservation Area				
Thornton-le-Moors Conservation Area	Construction and Operation	✔		Potential for direct physical impacts based on route alignment. Potential for temporary impacts on the setting due to construction activity. Potential for permanent impacts on setting with the introduction of the Alcohols Site AGI.
Chester Canal Conservation Area	Construction	✔		Potential for direct physical impacts based on route alignment. Potential for temporary impacts on the setting due to construction activity.
	Operation		✔	Any potential for direct physical impacts based on route alignment will be incurred during the construction phase only. No change in setting during operation.
Scheduled monuments Hafod Wood Moated Site (Record No FL179) and Hen Blas Castle Site (Record Number FL062) and Grade II Listed Building Hafod Farmhouse (Record Number 26192).	Construction and Operation	✔		Potential for temporary impacts on the setting due to construction activity. Potential for permanent impacts on setting with the introduction of the Cornist Lane BVS.
Scheduled monuments Bryn y Cosyn Round Barrows (Record Number FL096) and Two Round Barrows 90m NE of Eosfan (Record Number FL046), Grade II* Listed Building Llwyn-erddyn (Record Number 350); Grade II listed buildings, Stable block and pigeon house at Plas Coch (Record Number 24668) and Cart house, smithy and pigsties at Plas Coch (Record Number 24669), Hollywell Common and Halkyn Mountain Historic Landscape.	Construction and Operation	✔		Potential for temporary impacts on the setting due to construction activity. Potential for permanent impacts on setting with the introduction of the Pentre Halkyn BVS.
Scheduled monuments Enclosure, Field System & Hollow-ways North of Pant (Record Number FL163), Hen Caerwys Deserted Village Site (Record Number FL162), Llyn Du Round Barrow (Record Number FL189), Offa's Dyke:Section N & S of the Circle on Holywell Racecourse, and Circle and Round Barrow (Record Number FL006) and Round Barrow 225m SE of Plas Newydd (Record Number FL076). Grade II* listed building Barn at Gellilyfdy (Record Number 24676). Grade II listed building Plas-newydd (Record Number 24687),	Construction and Operation	✔		Potential for temporary impacts on the setting due to construction activity. Potential for permanent impacts on setting with the introduction of the Babell BVS.

Element	Phase	Scoped In	Scoped Out	Justification
Gellilyfdy (Record Number 14880), Bakehouse at Gellilyfdy (Record Number 24674) and Stable at Gellilyfdy (Record Number 24675).				
Designated heritage assets within 500m of the carbon dioxide pipeline	Construction	✔		Potential for temporary impacts on the setting due to construction activity.
	Operation		✔	No change in setting during operation.
Non-designated below-ground heritage assets and palaeoenvironmental deposits within the Newbuild Infrastructure Scoping Boundary (excluding BVS)	Construction	✔		Potential for direct physical impacts based on route alignment.
	Operation		✔	Any potential for direct physical impacts based on route alignment will be incurred during the construction phase only.
Non-designated below-ground heritage assets and palaeoenvironmental deposits at the BVS	Construction and Operation		✔	These works are within the existing Flint-PoA Pipeline easement. It is not anticipated there will be any impacts and effects on below ground heritage assets or deposits as they will have been removed during the installation of the existing pipeline.
Non-designated above ground heritage assets within the Newbuild Infrastructure Scoping Boundary	Construction and Operation	✔		Potential for direct physical impacts based on route alignment. Potential for temporary impacts on the setting due to construction activity. Potential for permanent impacts on setting with the introduction of the AGIs.
Historic Landscape Character (including hedgerows) within the Newbuild Infrastructure Scoping Boundary	Construction and Operation	✔		Potential for direct physical impacts based on route alignment. Impacts for the AGI site would be permanent. Impacts for the carbon dioxide pipeline are anticipated to be temporary.

7.6. OPPORTUNITIES FOR ENHANCING THE ENVIRONMENT

7.6.1. Opportunities for delivering enhancement to the historic environment resource through the Proposed Development will be explored during assessment. Any enhancements will be discussed and agreed in consultation with Cadw, Historic England, Clwyd-Powys Archaeological Trust and Cheshire Archaeology Planning Advisory Service.

7.7. PROPOSED ASSESSMENT METHODOLOGY

7.7.1. The assessment will be in undertaken in accordance with all applicable legislation and planning policies (national and local), including:

- Overarching National Policy Statement for Energy (EN-1), 2011, Section 5.8 (Historic Environment) (**Ref. 7-11**);
- Planning Policy Wales, 2021 Section 6.1 (The Historic Environment) (**Ref. 7-12**); and
- National Planning Policy Framework, 2019, Section 16 (Conserving and enhancing the historic environment) (**Ref 7-13**).

7.7.2. The following methodology for assessment is proposed:

- DMRB LA 106 states that a detailed assessment for archaeological remains and non-designated Heritage Assets should comprise a Historic Environment Desk-Based Assessment (HEDBA)[2] (**Ref. 7-14**). The HEDBA will include a narrative of the historical and archaeological context of the Newbuild Infrastructure Scoping Boundary and immediate environ within the 500m Study Area. The HEDBA will include a site walkover, which will be undertaken for the purposes of identifying any previously unrecorded archaeological assets within the Newbuild Infrastructure Scoping Boundary. The site visit will also assess the effect of the Proposed Development on the settings of designated assets within the 1 km Study Area around the AGIs. The HEDBA will present the significance of assets on which there is a predicted impact from the Proposed Development using the values outlined in the guidance from Cadw (**Ref. 7-1**) (Cadw, 2011) and Historic England (**Ref. 7-15**) (evidential, historical, aesthetic and communal). The HEDBA will be prepared in accordance to Cadw (**Ref. 7-1**, **Ref. 7-2, Ref. 7-16**) Historic England (**Ref. 7-15, Ref. 7-5**) and CIfA standards and guidance (**Ref. 7-17**).

[2] Please note, in the absence of specific guidance for Cultural Heritage for EIA, the DMRB is commonly used for schemes that are not highways projects.

- The baseline will be informed by an archaeological geophysical survey of land within the Newbuild Infrastructure Scoping Boundary, undertaken in accordance with CIfA standards and guidance (**Ref. 7-18**). The scope of the archaeological geophysical survey will be determined in consultation with Clwyd-Powys Archaeological Trust and Cheshire Archaeology Planning Advisory Service.
- Loss or disturbance of known and unknown below-ground heritage assets, palaeoenvironmental deposits and historic landscapes will be considered qualitatively in line with the principles set out in DMRB (**Ref. 7-14** and **Ref. 7-19)**, National Policy Statement for Energy (EN-1) (**Ref. 7-11**), Planning Policy Wales (**Ref. 7-16** and **Ref. 7-12**), National Planning Policy Framework (**Ref. 7-13**) based on the combination of the potential value of any assets identified and the magnitude of harm associated with the construction phase of the Proposed Development.
- The qualitative evaluation of potential effects upon the setting of Designated and Non-Designated Heritage Assets during the construction and operation phase will be undertaken in line with the methodology set out in the National Policy Statement for Energy (EN-1) (**Ref. 7-11**), Cadw (**Ref. 7-2**) and Historic England (**Ref. 7-5**) guidance and the requirements of Planning Policy Wales (**Ref. 7-16** and **Ref. 7-12**) National Planning Policy Framework (**Ref. 7-13**).

7.8. LIMITATIONS AND ASSUMPTIONS

7.8.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- The assessment will be compiled using Heritage Asset data obtained from third party sources (e.g. HER) and the prediction of effects will be dependent on the accuracy of the data received.
- Due to the nature of below ground (archaeological) remains, their identification and assessment necessarily requires an element of assumption. The nature, extent, survival, and even the precise location, of buried archaeological remains are often uncertain, as many sites have not been subject to archaeological investigation to modern standards. Assessment of the value of such sites (as part of the assessment process) is often, therefore, heavily reliant on informed extrapolation from limited data, comparison with similar assets in similar contexts and, ultimately, on professional judgment.

- The aim of the archaeological geophysical survey will be to identify below ground heritage assets of potential archaeological origin. The archaeological origin, date and value of any anomalies identified in the geophysical survey can only be confirmed through intrusive archaeological investigation. The identification of geophysical anomalies can be adversely influenced by the natural geology and agricultural practices (i.e. spreading of green waste material).
- The assessment will not include any internal inspections or surveys inside of any built Heritage Assets or properties.
- The assessment assumes that the North East Wales Archives (Hawarden and Ruthin) and Cheshire Archives and Local Studies (Chester) will be accessible. If they are closed, all reasonable efforts will be made to obtain the relevant information from other local repositories or online.

7.9. REFERENCES

- **Ref. 7-1** Cadw. (2011). Conservation Principles. Cardiff: Welsh Government.
- **Ref. 7-2** Cadw. (2017). Setting of Historic Assets in Wales. Cardiff: Welsh Government.
- **Ref. 7-3** Historic England. (2011). Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (second edition). Swindon: Historic England.
- **Ref. 7-4** Historic England. (2015). Geoarchaeology: Using earth sciences to understand the archaeological record. Swindon: Historic England.
- **Ref. 7-5** Historic England. (2017). The Setting of Heritage Assets. Historic England Good Practice in Planning: 3 (2nd edition).
- **Ref. 7-6** Historic England. (2016a). Understanding Historic Buildings: A Guide to Good Recording Practice.
- **Ref. 7-7** Historic England. (2016b). Preserving Archaeological Remains: Decision-taking for Sites under Development. Swindon: Historic England
- **Ref. 7-8** Historic England. (2020). Deposit Modelling and Archaeology. Guidance for Mapping Buried Deposits. Swindon: Historic England.
- **Ref. 7-9** Chartered Institute for Archaeologists (CIfA). (2014a). Standard and Guidance for Archaeological Excavation.
- **Ref. 7-10** CIfA. (2014b). Standard and Guidance for an Archaeological Watching Brief.
- **Ref. 7-11** Department of Energy and Climate Change. (2011). Overarching National Policy Statement for Energy (EN-1).
- **Ref. 7-12** Welsh Government. (2021). Planning Policy Wales. Cardiff: Welsh Government.

- **Ref. 7-13** Ministry of Housing, Communities and Local Government. (2019). National Planning Policy Framework.
- **Ref. 7-14** Highways England. (2019). Design Manual for Roads and Bridges, LA 106: Cultural Heritage Assessment.
- **Ref. 7-15** Historic England (formerly English Heritage). (2008). Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment. Swindon: English Heritage.
- **Ref. 7-16** Welsh Government. (2018, April 6). Planning Policy Wales. Technical Advice Note 24: The Historic Environment. Cardiff: Welsh Government. Retrieved from Welsh Government: https://gov.wales/sites/default/files/publications/2018-09/tan24-historic-environment.pdf
- **Ref. 7-17** CIfA. (2020a). Standards and Guidance for Desk-based Assessment.
- **Ref. 7-18** CIfA. (2020b). Standard and guidance for archaeological geophysical survey. Reading: CIfA.
- **Ref. 7-19** Highways England. (2020). Design Manual for Roads and Bridges, LA 104: Environmental Assessment and Monitoring.

8. BIODIVERSITY

8.1. INTRODUCTION

8.1.1. This Chapter considers the impact of the Proposed Development on Biodiversity. It sets out the proposed methodology for assessment and identifies those features/receptors with the potential to be affected by the Proposed Development as well as those where it has been considered possible to scope out of the EIA.

8.2. STUDY AREA

8.2.1. Whilst the Newbuild Infrastructure Scoping Boundary for the Proposed Development is defined, it is necessary to apply study areas of varying sizes dependent on the ecological receptor/feature under assessment. These are further discussed below for Desk Study and Field Survey.

8.2.2. Consultation with Natural England (NE) and Natural Resources Wales (NRW) has commenced in order to introduce the Proposed Development and discuss the proposed approach to field surveys and assessment. Survey types, methods and Study Areas have been subject to initial discussions with comment sought from NE and NRW. The approach to assessment and survey following initial consultation is detailed below.

DESK STUDY

8.2.3. A preliminary desk study has been completed following best practice guidelines (**Ref. 8-1** and **8-2**). The desk study included a review of publicly available resources and databases to determine the presence of protected sites, priority habitats (as defined by the Natural Environment and Rural Communities (NERC) Act (2006) (**Ref. 8-3**) and Environment Act Wales (2016) (**Ref. 8-4**)) and woodland listed on the Ancient Woodland Inventory (AWI). The following search distances were applied:

- Up to 10km from the Newbuild Infrastructure Scoping Boundary for statutory designated sites of international importance[3] and those listed within the National Site Network (extended to 30km for Special Areas of Conservation (SAC) designated for bat species);
- Statutory designated sites of national importance within 2km of the Newbuild Infrastructure Scoping Boundary [4];
- Priority habitats and woodland listed on the AWI within 1km of the Newbuild Infrastructure Scoping Boundary; and

[3] Special Area of Conservation (SAC), Special Area of Protection (SPA) and Ramsar sites.
[4] Site of Special Scientific Interest (SSSI), Local Nature Reserve (LNR), National Nature Reserve (NNR).

- Historic protected species licenses within 2km of the Newbuild Infrastructure Scoping Boundary.

8.2.4. A full desk study is to be completed with requests for biological records to be made to relevant biological records centres, primarily Cofnod and rECOrd[5], and relevant specialist interest groups (e.g. Amphibian and Reptile Groups).

8.2.5. Search radii for records requests will encompass:

- Records of protected and/or notable species within 2km of the Newbuild Infrastructure Scoping Boundary;
- Records of bat species within 5km of the Newbuild Infrastructure Scoping Boundary; and
- Locations of non-statutory designated sites within 2km[6] of the Newbuild Infrastructure Scoping Boundary.

FIELD SURVEY

8.2.6. Field surveys have commenced to gather data which will inform the EIA. Surveys are being, and will be, completed in line with relevant current good practice guidelines. Where deviations from best practice or where no best practice guidance is available, approaches to survey effort will be justified with survey methods and/or limitations within the EIA.

8.2.7. **Table 8-1** details survey corridors of initial baseline surveys along with relevant current good practice guidance.

Table 8-1: Receptor, Survey Buffer and Reference to Best Practice Guidelines

Receptor	Survey Corridor	Good Practice Guideline Reference
Habitats	100m	Phase 1 Habitat Survey: Joint Nature Conservation Committee (JNCC) (2010) (**Ref. 8-5**). National Vegetation Classification**:** Rodwell, (2006) (**Ref. 8-6)**.
Badger	100m	Harris, Cresswell and Jefferies (1989) (**Ref. 8-7)**. Roper, T.J. (2010) (**Ref. 8-8)**

[5] Biological records from Cofnod cover areas within North Wales, with records from rECOrd covering Cheshire and Wirral areas.
[6] Sites of Nature Conservation Importance (SNCI), Sites of Importance to Nature Conservation (SINC), Local Wildlife Sites (LWS).

Receptor	Survey Corridor	Good Practice Guideline Reference
		Andrews, R. (2013) (**Ref. 8-9)**.
Bat	100m	Collins, J. (2016) (**Ref. 8-10**).
Birds – breeding and wintering	No defined corridor – specifically selected transects only	Wintering Bird Surveys**:** Gillings et al., (2008) (**Ref. 8-11**), Gilbert et al., (1998) (**Ref. 8-12**). Breeding Bird Surveys**:** Biddy *et al.* (2000) (**Ref. 8-13**). Farmland Birds Surveys**:** Biddy *et al.* (2000) (**Ref. 8-13**). Wetland and Intertidal Birds Surveys: Biddy *et al.* (2000) (**Ref. 8-13**).
Barn Owl	100m	Shawyer, (2011) (**Ref. 8-14**).
Great Crested Newt	500m	Habitat Suitability Index Assessment**:** Oldham *et al.,* (2000) (**Ref. 8-15**), and Amphibian and Reptile Groups (ARG) of the United Kingdom, (2010) (**Ref. 8-16**). Environmental DNA (eDNA) surveys**:** Biggs *et al.,* (2014) (**Ref. 8-17**). Presence / Absence Surveys**:** English Nature (2001) (**Ref. 8-18**) and Gent, A., and Gibson, S., (1998) (**Ref. 8-19**).
Otter	150m[7]	Chanin (2003) (**Ref. 8-20**).
Water Vole	150m[7]	Dean, *et al.,* (2016) (**Ref. 8-21**).
Aquatic Habitats	50m	British Standards Institution (2003) (**Ref. 8-22**). British Standards Institution (2012) (**Ref. 8-23**). Environment Agency (2001) (**Ref. 8-24**). Environment Agency (2007) (**Ref. 8-25**).

[7] Upstream and downstream of proposed watercourse crossing points

Receptor	Survey Corridor	Good Practice Guideline Reference
		Environment Agency (2017) (**Ref. 8-26**). Pond Action (1998) (**Ref. 8-27**). Pond Action (2002) (**Ref. 8-28**). Water Framework Directive – United Kingdom Technical Advisory Group (WFDUKTAG). (2014) (**Ref. 8-29**).

8.2.8. Once completed, the surveys detailed in **Table 8-1** will define the requirements for further surveys and assessment which may necessitate a revision of survey/study areas and boundaries. Survey Areas will also be subject to change as a result of refinement to the design of the Proposed Development and are therefore not fixed.

8.3. BASELINE CONDITIONS

8.3.1. The following data sources have been consulted to inform the baseline review:

- Multi Agency Geographic Information for the Countryside (MAGIC) website; and
- Biological records received from relevant biological records centres[8].

8.3.2. In addition to the above, baseline conditions within the Newbuild Infrastructure Scoping Boundary have been identified utilising a suite of desk-based programs and data sources. These have been interrogated to determine the presence of nationally or internationally protected, or otherwise classified, sites and habitats up to a distance of 10km beyond the Newbuild Infrastructure Scoping Boundary.

INTERNATIONAL DESIGNATED SITES

8.3.3. **Table 8-2** details internationally designated sites located within 10km of the Proposed Development alongside a summary of a sites reason for designation. Internationally designated sites are additionally illustrated in **Figure 8-1** in **Appendix A: Figures**.

8.3.4. There are no SAC sites designated for bat species within 30km of the Newbuild Infrastructure Scoping Boundary.

[8] Biological records have been requested for the southern route option only, as the northern route option was a late consideration. Biological records, whilst covering the area of the northern route option, do not currently extend from this option and a subsequent records request is proposed.

Table 8-2: International Designated Sites

Designation	Approx. Size (ha)	Approximate Distance and Orientation from Newbuild Infrastructure Scoping Boundary	Summary of Features for Site Designation
River Dee and Bala Lake SAC	1,309	0m – spanned by the Proposed Development	The SAC is designated for its presence of sea lamprey *Petromyzon marinus*, brook lampray *Lampetra planeri,* Atlantic salmon *Salmo salar* and plant species such as floating water-plantain *Luronium natans.*
Dee Estuary SAC	15,806	700m north	This large site comprises of an estuary, saltmarshes, mudflats and sandflats. The SAC is designated for its presence of mudflats and sandflats which during low tide are not covered by seawater. The SAC also mentions the importance of annuals, including *Salicornia* sp., which colonize the mud and sands within the site area. Atlantic salt meadows *Glauco-Puccinellietalia maritimae* form the most extensive type of saltmarsh in the Dee, helping displace vast amounts of *Spartina anglica,* a non-native common cordgrass.
The Dee Estuary SPA & Ramsar	14,292	700m north	The Dee Estuary is a large, sheltered estuary which is internationally important due to the number of waterfowl and waders it supports. Qualifying interests includes a breeding colony of natterjack Toad *Bufo calamita* and over 20,000 individual waterbirds each year such as redshank *Tringa tetanus* and black-tailed godwit *Limosa limosa.*
Deeside and Buckley Newt Sites SAC	208	50m north	This site in north-east Flintshire is designated for the the largest populations of great crested newt *Triturus cristatus* in Great Britain. The site also includes European bullhead *Cottus gobio,* and old sessile oak *Quercus petraea* woods with holly *Ilex sp.* and hard fern species *Blechnum sp.*
The Mersey Estuary Ramsar & SPA	5,024	600m north	The sites importance is noted regarding feeding and roosting sites for waterfowl. Golden plover *Pluvialis apricaria* are an Annex I species qualifying species found at the site. The site is regularly used by over 20,000 waterbirds in any season.
Midland Meres & Mosses Phase 1 Ramsar	511	8.2km east	A series of 16 sites made up of nutrient-rich open water bodies with fringing habitats of reed swamp, fen, carr and damp pasture and peatlands.
Midland Meres & Mosses Phase 2 Ramsar	1,594	8.5km east	A series of 18 sites made up of nutrient-rich open water bodies with fringing habitats of reed swamp, fen, carr and damp pasture and peatlands.
Halkyn Mountain (Mynydd Helygain) SAC	611	1.2km west	Halkyn Mountain includes an extensive Calaminarian grassland of *Violetalia calaminariae.* There is a large population of great crested newt, which breed in the abandoned quarry workings and across the site. Other Annex I qualifying habitats include European dry heaths, semi-natural dry grasslands and scrubland facies on calcareous substrates, and *Molinion caeruleae* meadows are also present on the calcareous, peaty or clayey-silt-laden soils.

Designation	Approx. Size (ha)	Approximate Distance and Orientation from Newbuild Infrastructure Scoping Boundary	Summary of Features for Site Designation
Alyn Valley Woods SAC	167	5.6km south	Characterised by three of the habitat types that are listed in Annex I of the SAC Directive: the Tilio-Acerion forests of slopes, screes and ravines, alluvial forests of alder *Alnus glutinosa* and ash *Fraxinus excelsior* and areas of semi natural dry grassland and scrubland facies on a calcareous substrate.

NATIONAL DESIGNATED SITES

8.3.5. Nationally designated sites located within 2km of the Newbuild Infrastructure Scoping Boundary have been identified and presented in **Table 8-3** below with a description of a sites reason for designation also provided. Nationally designated sites are illustrated in **Figure 3-9 to 3-12** in **Appendix A: Figures**.

Table 8-3: Nationally Designated Sites

Designation	Approx. Size (ha)	Approximate Distance and Orientation from Newbuild Infrastructure Scoping Boundary	Summary of Features for Site Designation
Flint Mountain Mynydd Y Fflint) Site of Special Scientific Interest (SSSI)	26	0m – spanned by Proposed Development	The site is of special interest for its stands of unimproved neutral grassland and semi-natural broadleaved woodland, which occur in association with scrub, fen-meadow and swamp vegetation. Notable species include pale flax *Linum bienne,* restharrow *Ononis repens,* figwort *Scrophularia nodosa* and hemp agrimony *Eupatorium cannabinum.*
Dee Estuary SSSI	13,680	700m north	The Dee Estuary is a large, sheltered estuary which is internationally important due to the number of waterfowl and waders it supports. Habitats include intertidal mud and sandflats, rocky sandstone cliffs of Hilbre Island and Middle Eye with species including sandhill rustic moth *Luperina nickerlii gueneei,* a Red Data Book species.
River Dee (Afon Dyfrdwy) SSSI	1,490	0m – spanned by the Proposed Development	The SAC is designated for its presence of sea lamprey *Petromyzon marinus*, brook lampray *Lampetra planeri,* Atlantic salmon *Salmo salar* and plant species such as floating water-plantain *Luronium natans.*
Connah's Quay Ponds and Woodland SSSI	94	50m north	Part of 'The Deeside and Buckley Newts Site SAC'. This site includes Broadoak Wood, Wepre Country Park, Gathering Grounds Wood and Llwyni Pond Local Nature Reserve. The site is of special interest for its population of great crested newt and its assemblage of widespread amphibian species, and for its semi-natural broadleaved woodland.
Maes Y Grug SSSI	18	900m south	The site is of special interest for its population of great crested newt, and forms part of the Deeside and Buckley Newts Site SAC. Habitats comprise a mosaic of grassland, scrub and woodland habitats surrounding waterbodies that have been managed or allowed to develop naturally.

Designation	Approx. Size (ha)	Approximate Distance and Orientation from Newbuild Infrastructure Scoping Boundary	Summary of Features for Site Designation
Mersey Estuary SSSI	6,715	600m north	The Mersey Estuary is an internationally important site for wildfowl and consists of large areas of intertidal sand and mudflats. The site also includes an area of reclaimed marshland, saltmarshes, brackish marshes and boulder clay cliffs with freshwater seepages. Notable species include curlew *Numenius arquata* and golden plover *Pluvialis apricaria.*
Gathering Grounds Woods & Llwyni Pond Local Nature Reserve (LNR)	3	1.2km north	This site is within the Connah's Quay Ponds and Woodland SSSI and The Deeside and Buckley Newts Site SAC. The site is notable due to its presence of great crested newt. Other notable species include, badger *Meles Meles*, field vole *Microtus agrestis*, blue tit *Cyanistes caeruleus,* chaffinch *Fringilla coelebs*, tawny owl *Strix aluco,* redwing *Turdus iliacus and* dunnock *Prunella modularis*.
Buckley Claypits and Commons SSSI	100	600m south	This site forms part of the Deeside and Buckley Newt SAC, and is notable due to its presence of great crested newt. Breeding reed bunting *Emberiza schoeniclus* and water vole are also present.
Stanney Woods LNR	26	1.3km north	Stanney Woods is an ancient woodland including species such as oak *Quercus robur*, silver birch *Betula pendula*, hazel *Corylus avellana* and holly *Ilex aquifolium*. Species comprise treecreeper *Certhia familiaris* and nuthatch *Sitta europaea.* The site is also a regionally important geological site (RIGS).
Helsby Quarry LNR	3	1.7km east	Helsby Quarry was designated a LNR in 2001 after being reclaimed as a former sandstone quarry. Tree species include rowan *Sorbus aucuparia*, silver birch *Betula pendula*, beech *Fagus sylvatica* and willow *Salix sp.* Understory species include hornbeam *Carpinus betulus*, whitebeam *Sorbus aria* alder *Alnus glutinosa* and guelder rose *Viburnum opulus*.
Halykn Common and Holywell Grasslands/Comin Helygain a Glaswell Tiroedd Treffynnon SSSI	699.3	500m north	Halkyn Common and Holywell Grasslands is of special interest for the mineralisation associated with the Carboniferous Limestone and cherts which is found in spoil tips and in situ exposures; open vegetation on soils rich in heavy metals; calcareous grassland; dry heath; fen meadow; base-rich flush; populations of spring sandwort *Minuartia verna*, stemless thistle *Cirsium acaule*. An assemblage of widespread amphibian species including great crested newt are also present.
Parc Linden SSSI	10.2	1.4km south east	Parc Linden is an area of enclosed pasture located close to the village of Lixwm on a shallow glacial drift over carboniferous limestone. The site supports unimproved calcareous grassland, acid grassland, limestone pavement, bracken and scrub. Parc Linden is of special interest for its unimproved calcareous grassland which is the best-known example of its type in Clwyd (Flintshire). A small partially wooded limestone pavement occurs in the northern part of the site.

Designation	Approx. Size (ha)	Approximate Distance and Orientation from Newbuild Infrastructure Scoping Boundary	Summary of Features for Site Designation
Coed Trefraith SSSI	11	1.4km south	Designated for its botanical interest. One of the best examples in Clwyd (Flintshire) of a woodland type found mainly in Wales and south-west England but also in the Midlands and north-east England. In north Wales the majority of the examples are in Clwyd at low altitudes, the remainder being in West Gwynedd.
Parc Bodlondeb and Gwenallt-Parc SSSI	17.5	2.0km south	Parc Bodlondeb and Gwenallt-Parc is an area of enclosed pasture located close to the village of Lixwm, on a shallow glacial drift over Carboniferous Limestone. The site supports a mosaic of unimproved calcareous, acid and neutral grasslands together with limestone heath and stands of bracken, scrub and broadleaved woodland. It is of special interest for its unimproved calcareous grassland, limestone heath and species-rich acid grassland. All these types have highly localised national distributions. Additional interest is provided by the neutral grassland, scrub and woodland communities.

HABITATS AND PROTECTED/NOTABLE SPECIES

8.3.6. In the absence of field survey data, the following is provided on the basis of desk-study results and interrogation of publicly accessible databases and mapping.

8.3.7. The Proposed Development extends through a landscape dominated by arable and agricultural land punctuated by extensive hedgerow field boundaries, many with accompanying mature trees. The Proposed Development additionally spans a number of watercourses, roads (including motorways) and rail crossings as well as passing through and adjacent to industrial/commercial and residential infrastructure.

8.3.8. Woodland, primarily deciduous woodland, which is categorised as a Priority Habitat, is located within and adjacent to the Newbuild Infrastructure Scoping Boundary in both England and Wales. AWI-listed woodland whilst present within 2km of the Newbuild Infrastructure Scoping Boundary in both England and Wales, is predominantly located within and immediately adjacent to the Newbuild Infrastructure Scoping Boundary within Wales.

8.3.9. Priority habitats identified from the desk study include deciduous woodland, hedgerows, lowland meadows, coastal floodplain and grazing marsh, lowland fens and reedbeds, coastal saltmarsh, watercourses and waterbodies. Further priority habitats are likely to be encountered through the course of field surveys, for example arable field margins.

8.3.10. An initial request for records of protected and/or notable species was made to Cofnod, rECOrd and the British Trust for Ornithology (BTO). Records returned encompassed a range of protected and/or notable species records within 2km of the Newbuild Infrastructure Scoping Boundary including badger *Meles meles,* great crested newt *Triturus cristatus*, otter *Lutra lutra,* water vole *Arvicola amphibius*, birds and fish species.

8.3.11. Further records requests are to be submitted to Cofnod and rECOrd as well as specialist interest groups (e.g. local Amphibian and Reptile Groups, RSPB, etc.) and other relevant bodies (e.g. Cheshire Wildlife Trust, Environment Agency) to support the EIA.

8.4. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

8.4.1. Avoidance and mitigation measures will be developed throughout the design process of the Proposed Development. Based on the results of surveys and assessments, mitigation measures leading to the avoidance, reduction or compensation of adverse effects will be identified prior to an evaluation of the effects of impacts (i.e. this will constitute ‘embedded’ mitigation). Such mitigation measures will be included within a Register of Commitments as part of the ES.

8.4.2. Thereafter, any residual impacts identified following implementation of embedded mitigation measures will be identified. Monitoring requirements will also be explored, and requirements determined once full survey results have been interpreted and full Proposed Development details known.

8.4.3. The principles of Biodiversity Net Gain will be applied, with the Proposed Development seeking to achieve Net Gains of Priority Habitats (as identified within the Natural Environment and Rural Communities (NERC) Act (2006) Section 41 habitat of principal importance in England and Section 7 of the Environment Act Wales (2016) in Wales).

8.5. DESCRIPTION OF LIKELY SIGNIFICANT EFFECTS

8.5.1. **Table 8-4** details those receptors/ features scoped in or out of further assessment of the Biodiversity ES Chapter. Each receptor/ feature is accompanied by a justification for its inclusion or exclusion from further assessment.

8.5.2. The Proposed Development, for its majority, comprises a short-term and temporary impact to facilitate construction (excluding Above Ground Installation (AGI) locations). The majority of receptors will only be subject to potential effects during construction. Operational effects are currently considered to be limited to AGI locations only. At the time of writing, lighting and noise disturbance have not been defined and have therefore been scoped into further assessment, as detailed in **Table 8-4**.

Table 8-4: Elements Scoping In or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Ecological impacts arising from Existing Pipeline Works (excluding Block Valve Stations)	Construction Operation		✔	No physical works consented within this Application. Therefore, no impact pathways relevant to ecological and biodiversity.
Designated Sites – National and International	Construction	✔		The Proposed Development could potentially pass through the Flint Mountain SSSI and will cross the River Dee SAC. The potential therefore exists for direct physical impacts (e.g. direct loss of habitat) and indirect impacts (e.g. pollution events) on designated sites during construction.
Habitats of Conservation Importance (e.g. Priority Habitats incl. hedgerows)	Construction	✔		The Proposed Development could potentially pass through and in proximity to habitats of conservation importance. Sections of hedgerow will require removal to facilitate an open cut method of pipeline installation. The removal of sections of hedgerow will be limited to the construction phase only. The potential therefore exists for direct physical impacts (e.g. direct loss of habitat) and indirect impacts (e.g. pollution events) to habitats of conservation importance during construction.
Watercourses and Waterbodies	Construction	✔		The Proposed Development alignment traverses through and in proximity to watercourses and waterbodies. The potential therefore exists for direct physical impacts (e.g. manipulation or alteration of channels) and indirect impacts (e.g. pollution events) during construction.
Badger	Construction & Operation	✔		Habitats within the Newbuild Infrastructure Scoping Boundary have the potential to support badger. The potential therefore exists for direct physical impacts to badger and their setts (e.g. loss of badger setts) as well as indirect impacts (e.g. vibration or noise disturbance) to resident badger during construction. Potential indirect effects (e.g. light spill from lighting installations and noise disturbance) from AGI locations may have an impact upon badger during operation of the Proposed Development.
Bats	Construction & Operation	✔		Habitats within the Newbuild Infrastructure Scoping Boundary have the potential to support bats and their roosts and the potential therefore exists for direct physical impacts to bat roosts and bats (e.g. damage to, or loss of bat roosts), impacts to foraging and commuting routes through severance of habitat (primarily through loss of hedgerows), as well as indirect impacts (e.g. vibration, light or noise disturbance) to bats during construction. Potential indirect effects (e.g. light spill from lighting installations and noise disturbance) from AGI locations may have an impact upon bats during operation of the Proposed Development.
Birds	Construction & Operation	✔		Habitats within the Newbuild Infrastructure Scoping Boundary have the potential to support nesting / roosting / overwintering bird species. The potential therefore exists for direct physical impacts (e.g. loss of nests) and indirect impacts (e.g. disturbance to nesting birds) to birds during construction. Potential indirect effects (e.g. light spill from lighting installations and noise disturbance) from AGI locations may have an impact upon birds, in particular nocturnal species (e.g. barn owl *Tyto alba*) during operation of the Proposed Development.
Amphibians (incl. great crested newt)	Construction	✔		Waterbodies (and adjacent habitats) have been identified within and adjacent to the Newbuild Infrastructure Scoping Boundary which may support great crested newt. In addition, the Deeside and Buckley Newt SAC is located within 250m of the Newbuild Infrastructure Scoping Boundary. As such, the presence of great crested newt cannot be

Element	Phase	Scoped In	Scoped Out	Justification
				discounted. The potential therefore exists for direct physical impacts (e.g. loss of ponds or supporting terrestrial habitats) and indirect impacts (e.g. pollution events to ponds and waterbodies) to great crested newt during construction.
Reptiles	Construction	✔		Habitats within the Newbuild Infrastructure Scoping Boundary have the potential to support common reptile species. The potential therefore exists for direct physical impacts (e.g. mortality of individuals and loss of hibernacula) on reptiles during construction.
Otter *Lutra lutra*	Construction & Operation	✔		A variety of watercourses are present within and adjacent to the Newbuild Infrastructure Scoping Boundary with the potential to support otter. The potential therefore exists for direct physical impacts (e.g. impacts to, or loss of, holts) and indirect impacts (e.g. vibration, light or noise disturbance) to otter during construction. Potential indirect effects (e.g. light spill from lighting installations and noise disturbance) from AGI locations may have an impact upon otter during operation of the Proposed Development.
Water Vole *Arvicola amphibius*	Construction & Operation	✔		A variety of watercourses are present within and adjacent to the Newbuild Infrastructure Scoping Boundary with the potential to support water vole. The potential therefore exists for direct physical impacts (e.g. impacts to, or loss of, burrows) and indirect impacts (e.g. vibration disturbance) to water vole during construction. Potential indirect effects (e.g. light spill from lighting installations and noise disturbance) from AGI locations may have an impact upon water vole during operation of the Proposed Development.
Terrestrial Invertebrates	Construction	✔		Habitats within and adjacent to the Newbuild Infrastructure Scoping Boundary may support terrestrial invertebrate species of conservation concern. The potential therefore exists for direct physical impacts (e.g. loss of core habitat) and indirect impacts (e.g. pollution events) to terrestrial invertebrate during construction.
Fish	Construction &Operation	✔		The Proposed Development has the potential to traverse through and be located in close proximity to watercourses and waterbodies. The potential therefore exists for direct physical impacts (e.g. mortality of fish or direct impacts to, or loss of, habitat) and indirect impacts (e.g. pollution events and disturbance through vibration or noise) to fish during construction. Potential indirect effects (e.g. light spill from lighting installations and noise disturbance) from AGI locations may have an impact upon fish during operation of the Proposed Development.
Aquatic Macroinvertebrates (incl. white-clawed crayfish *Austropotamobius pallipes)*	Construction	✔		The Proposed Development has the potential to traverse through and be located in close proximity to watercourses and waterbodies. The potential therefore exists for direct physical impacts (e.g. direct loss of/impacts to habitat) and indirect impacts (e.g. pollution events) to aquatic macroinvertebrates including white-clawed crayfish during construction.
Macrophytes	Construction	✔		The Proposed Development has the potential to traverse through and be located in close proximity to watercourses and waterbodies. The potential therefore exists for direct physical impacts (e.g. direct loss of/impacts to habitat) and indirect impacts (e.g. pollution events) to macrophytes during construction.
Other Mammals	Construction & Operation	✔		The Proposed Development has the potential to traverse through and be located in close proximity to habitat suitable to support other mammals such as hedgehog *Erinaceus europaeus,* brown hare *Lepus europaeus* and harvest mouse

Element	Phase	Scoped In	Scoped Out	Justification
				Micromys minutus. The potential therefore exists for direct physical impacts (e.g., direct loss of habitat) and indirect impacts (e.g., pollution events) on other mammals during construction. Potential indirect effects (e.g. light spill from lighting installations and noise disturbance) from AGI locations may have an impact upon other mammals during operation of the Proposed Development. Surveys are not currently considered to be required for other mammal species. An assessment will be made utilising desk-based data only.
Hazel Dormouse *Muscardinus avellanarius*	Construction	✔		The Proposed Development has the potential to traverse through and be located in close proximity to habitat suitable to support hazel dormouse, such as hedgerows. No records exist for hazel dormouse within the Newbuild Infrastructure Scoping Boundary and 2km biological records search area. Whilst this species is rare in the area and pending the results of the desk study spanning the proposed block valve locations, the potential exists for direct physical impacts (e.g. mortality of individuals or direct impacts to, or loss of, resting places) and indirect impacts (e.g. pollution events and disturbance through vibration or noise) to hazel dormouse during construction.

8.6. OPPORTUNITIES FOR ENHANCING THE ENVIRONMENT

8.6.1. The National Policy Statement for Energy EN-1 (NPS-EN1) (2011) states that an applicant should *"…show the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests"* in respect of internationally, nationally or locally designated sites of ecological or geological interest. Further *"…species and habitats have been identified as being of principal importance for the conservation of biodiversity in England and Wales and thereby requiring conservation action."*

8.6.2. To ensure the Proposed Development aligns with national policy, policy of the individual devolved nations and local planning policies, the Proposed Development will aim to achieve a Net Gain of Priority Habitats (as defined by NERC (2006) and Environment Act Wales (2016)).

8.6.3. Where appropriate, the Proposed Development will explore opportunities to provide further benefits for biodiversity, for example through:

- Additional planting, particularly within areas currently of limited biodiversity value (e.g. improved grasslands);
- Seek to increase connectivity of habitats within the Proposed Development boundary and the wider landscape;
- Where hedgerows and trees are to be planted, native species, including fruit-bearing species, will be considered to provide foraging and nesting resource for birds and mammals;
- Provision of hibernacula or features with potential to be used by amphibians and reptiles; and
- Provision of bat and bird boxes, over and above those required for mitigation purposes, to replace lost trees and hedgerows suitable for use by these species.

8.7. PROPOSED ASSESSMENT METHODOLOGY

8.7.1. The approach to surveys and assessment detailed within this Scoping Report align with key National Policy Statements EN-1 and EN-4. EN-1 Part 5 – Biodiversity and Geological Conservation details the general principles to be applied as part of any assessment for Energy Infrastructure. The current proposed assessment methodology to ascertain the impacts of the Proposed Development on biodiversity align with the requirements of EN-1, including assessment of protected sites, habitats and species and including assessment through Habitats Regulations Assessment, where this is required.

8.7.2. The assessment will be undertaken in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) 'Guidance for Ecological Impact Assessment in the UK and Ireland' (2018) (herein referred to as the 'CIEEM Guidelines'). The CIEEM Guidelines represent the current best practice for assessing the ecological impact of development projects.

8.7.3. The assessment of likely significant environmental effects as a result of the Proposed Development will consider the construction and operational phases.

8.7.4. The duration of the effect will be assessed as either 'short-term', 'medium-term' or 'long-term'. Short-term is considered to be up to 1 year; medium-term is considered to be between 1 and 10 years and long-term is considered to be greater than 10 years.

DETERMINING IMPORTANCE

8.7.5. The CIEEM guidelines state that ecological features should be considered within a 'defined geographical context' (i.e. spatial scale), with International importance being the highest level, followed by International and European; National; Regional; Metropolitan, County, vice-county or other local authority-wide area; River Basin District; Estuarine system/Coastal cell; and Local importance representing the lowest level.

8.7.6. Assigning importance to ecological features is based on professional judgement informed by available guidance and information and expert advice.

DETERMINING SIGNIFICANCE OF EFFECTS

8.7.7. The ES assessment will use the CIEEM methodology to describe all significant effects on features of ecological importance.

8.7.8. The CIEEM guidelines define a significant effect in the context of an ecological impact assessment as "*an effect that either supports or undermines biodiversity conservation objectives for important ecological features or for biodiversity in general*". Significant effects, as defined by the CIEEM guidelines, are determined by assessing any deviation in the baseline conditions of a feature of ecological importance that may occur as a result of individual and cumulative impacts during the construction and operational phases of the Proposed Development. These effects will be expressed in terms of geographical scale, however, the geographical scale at which an effect is significant can vary from the geographical importance of the ecological feature being assessed and in accordance with the CIEEM guidelines, this will be a function of the assessment.

8.7.9. In addition, consideration will also be given to EIA terminology and significance will be concluded for both beneficial and adverse effects as either 'Negligible', 'Minor', 'Moderate' or 'Major', with significant effects determined through professional judgement as outlined in **Table 8-5**.

Table 8-5: Consistency of Significant Residual Effects in accordance with CIEEM and Conversion for consistency with the ES

Geographical scale at which a residual effect is assessed as being significant in line with CIEEM EcIA Guidelines	Category of significant residual effect used in Summary and Conclusions section of ES
International, European, National or Regional	Major
Regional, Metropolitan, County, Vice-County or other Local-Authority Wide Area, River Basin District, Estuarine system/Coastal cell	Moderate
Local	Minor
Effects on features of Site scale importance or limited effects on features of greater importance. No significant effects on key nature conservation features	Neutral / Negligible

8.7.10. The following terms would be used to define the significance of the effects identified and these can be 'beneficial' or 'adverse':

- **Major effect**: where the Proposed Development is likely to cause a considerable change from the baseline conditions and the receptor has limited adaptability, tolerance or recoverability or is of the highest sensitivity. This effect is considered to be 'significant';
- **Moderate effect**: where the Proposed Development is likely to cause either a considerable change from the baseline conditions at a receptor which has a degree of adaptability, tolerance or recoverability or a less than considerable change at a receptor that has limited adaptability, tolerance or recoverability. This effect is considered more likely to be 'significant' but will be subject to professional judgement; and
- **Minor effect**: where the Proposed Development is likely to cause a small, but noticeable change from the baseline conditions on a receptor which has limited adaptability, tolerance or recoverability or is of the highest sensitivity or a considerable change from the baseline conditions at a receptor which can adapt, is tolerant of the change or/and can recover from the change. In the context of this ES, residual effects which are 'significant at the Local level' and converted to a 'Minor' effect, are unlikely to be assessed as 'significant' overall.

8.8. LIMITATIONS AND ASSUMPTIONS

8.8.1. This Scoping Report is based on information available at the time of writing. Information on the site, as well as the design of the Proposed Development, is therefore subject to change.

8.8.2. To ensure transparency within the EIA process, the following limitations and assumptions have been identified at this stage:

- Where access restrictions prevent a full ecological baseline assessment, a precautionary principle will be applied to the assessment of any important ecological features. The precautionary principle will assume a 'reasonable worst-case' scenario informed by professional experience and knowledge, desk-based information and field-based evidence (where available) for any feature/receptor unable to be accessed or fully surveyed. Utilising the aforementioned approach will ensure that appropriate recommendations and/or mitigation are provided even though these may not later be required. Any recommendation/mitigation can thereafter be amended accordingly once access/survey has been possible.

8.9. REFERENCES

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- **Ref. 8-2** CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland, Terrestrial, Freshwater and Coastal.* CIEEM, Winchester.
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- **Ref. 8-4** HMSO (2016) Environment (Wales) Act 2016. Welsh Government.
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- **Ref. 8-6** Rodwell, J.S. (2006) *NVC Users' Handbook,* JNCC, Peterborough.
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- **Ref. 8-15** Oldham, R.S., Keeble J., Swan M.J.S., and Jeffcote M. (2000) *Evaluating the suitability of habitat for the great crested newt.* Herpetological Journal 10: 143-155.
- **Ref. 8-16** Amphibian and Reptile Groups of the United Kingdom (2010) *ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index*. ARG UK, UK.
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- **Ref. 8-18** English Nature (2001). *Great Crested Newt Mitigation Guidelines*. English Nature, Peterborough.
- **Ref. 8-19** Gent, A and Gibson, S. (1998) *Herpetofauna Workers Manual*, Joint Nature Conservation Committee, Peterborough.
- **Ref. 8-20** Chanin P (2003). *Monitoring the Otter Lutra lutra. Conserving Natura 2000 Rivers Monitoring Series No. 10*, English Nature, Peterborough.
- **Ref. 8-21** Dean, M., Strachan, R, Gow, D. and Andrews, R. (2016). *The Water Vole Mitigation Handbook (the Mammal Society Mitigation Guidance series).* Eds Fiona Mattews and Paul Chanin. The Mammal Society, London.
- **Ref. 8-22** British Standards Institution (2003). *BS EN 14011:2003: Water Quality Sampling of Fish with Electricity*. London, BSI.
- **Ref. 8-23** British Standards Institution (2012). *BS EN ISO 10870:2012 Water Quality – Guidelines for the selection of sampling methods and devices for benthic macroinvertebrates in fresh waters.* London. BSI.
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9. LAND AND SOIL

9.1. INTRODUCTION

9.1.1. This Chapter considers the impact of the Proposed Development on land and soils and identifies any potentially significant effects. It sets the proposed methodology for the land and soils assessment and identifies those impacts that can be scoped in and out of the Environmental Statement (ES).

9.2. STUDY AREA

9.2.1. The Study Area will comprise the Newbuild Infrastructure Scoping Boundary plus a 50m buffer beyond the Newbuild Infrastructure Scoping Boundary. This is considered to be the area that could be impacted in terms of land and soils based on the Proposed Development, surrounding sensitive environmental receptors, and contamination migration potential.

9.2.2. The 250m buffer around the Newbuild Infrastructure Scoping Boundary will be considered for potential mobile sources of groundwater contamination. This is consistent with safe development on contaminated land guidance document R&D66 (Guidance for the Safe Development on Contaminated Land, Volume 1, 2008) (**Ref. 9-1**), when considering the impacts of contamination on sensitive environmental receptors. However, it must be noted that this Study Area will be subject to further refinement once an intrusive ground investigation survey has been completed.

9.3. BASELINE CONDITIONS

9.3.1. The preliminary baseline for the Study Area is described below.

SOIL QUALITY

Soil Description

9.3.2. The Study Area includes the soil types predominantly comprising slowly permeable seasonally wet acid loamy and clayey soils but also including loamy and clayey soils of coastal flats with naturally high groundwater. There are some smaller areas of very and slightly acid loamy upland soils, freely draining floodplain and freely draining slightly acid sandy soils (**Ref. 9-2** and **Ref. 9-3**).

Agricultural Soils

9.3.3. Agricultural land within the Study Area that has to date been designated (not all land has been given a designation) includes Grade 3a (good quality) (included in Best and Most Versatile (BMV) land) and Grade 3b land (moderate quality) is located at the eastern end of the Study Area. The remainder of study area lies within land yet to be designated.

Geological Designation and Non-Designated Features

9.3.4. The River Dee is classified as a site of specific scientific interest (SSSI) for ecological reasons. An initial review suggests there are no Potential Regionally Important Geological Sites (RIGS) within the Study Area. Further assessment of third-party information during the baseline assessment will confirm.

PUBLISHED GEOLOGY

Superficial Geology

9.3.5. The superficial soils underlying the Study Area includes the following; Alluvium, Glacial Till (Diamicton), Peat, Glacial Sand and Gravel and Head Deposits.

Bedrock Geology

9.3.6. The bedrock geology that underlies the Study Area includes the following; Kinnerton Sandstone Formation, Chester Formation, Wilmslow Sandstone Formation, Lower and Middle Pennine Coal Measures, the Bowland Shale, the Gwespyr Sandstone, the Etruria Formation and the Hollin Rock Sandstone.

Coal Mining

9.3.7. The section of the of the Proposed Scheme that lies within Wales is located within a Coal Mining Reporting Area due to the legacy mining of the region, and potential for underling historical voids. The Coal Authority Interactive Map viewer (viewed 16 March 2021) (**Ref. 9-4**) indicates there are likely to be probable shallow mine workings and former mine shafts within the Study Area located near Shotton.

HYDROGEOLOGY

9.3.8. The superficial underlying aquifers comprise Secondary A aquifers and Secondary Undifferentiated aquifers.

9.3.9. The bedrock aquifers comprise Principal, Secondary A, Secondary B and Secondary Undifferentiated aquifers.

HYDROLOGY

9.3.10. The Study Area crosses several small surface water drains (e.g. the Thornton main drain) and several rivers including the River Gowy and the River Dee.

SENSITIVE HABITATS

9.3.11. The Study Area crosses the River Dee which is SSSI and therefore a sensitive habitat potential susceptible to mobile contamination impacts. It links to the Dee Estuary, which is a Special Protection Area (SPA), Special Area of Conservation (SAC) and RAMSAR site as its wetlands support waterfowl populations.

POTENTIAL SOURCES OF CONTAMINATION

9.3.12. The Study Area includes predominantly agricultural land with several former / current industrial land uses which could potentially provide contamination legacy. The Study Area is understood to cross a number of historical landfills, presenting potential sources of contamination, from records reviewed. This includes most noticeably a landfill crossed by the Proposed Development located close to the crossing of the A550 Gladstone way. Though it is noted it should be possible to avoid the landfill site itself during carbon dioxide pipeline route optimisation. An additional historical landfill named Brook Hill Landfill Site, is located immediately after Pinfold Lane, between Ewloe Green and Northop Hall. Further landfills are noted to be present south of Station Road in Lea by Backford, and west of Cryers Lane in Thornton-le-Moors. Additional assessment of third-party information during the baseline will clarify.

9.3.13. The presence of contaminants within the ground has the potential to impact both human health and controlled waters related to sensitive receptors. The risk to sensitive environs will be quantified as part of the intrusive ground investigation works and associated risk assessment reporting.

Potential Contaminant Pathways

9.3.14. The primary contaminant source to sensitive receptors pathways are summarised below:

Human Health

- Direct contact, soil ingestion and inhalation.
- Migration and accumulation of ground gas / mine gas in excavations/chambers and surrounding buildings and subsequent inhalation/asphyxiation by site preparation, earthworks, construction and building inhabitants.

Controlled Waters

- Infiltration of rainwater and leaching of contamination to shallow groundwater.
- Migration from groundwater into surface water bodies (Elton Green Brook, River Gowy and three of its tributaries near Thornton le Moors, Mill Brook, Backford Brook, Border Drain, Dee Estuary, Beeches Brook and Sandycroft Drain).
- Lateral and vertical leaching of contaminants into underlying aquifers.

Built Environment

- Accumulation of hazardous ground gas / mine within carbon dioxide pipeline service buildings / serviceable chambers associated with any pressure grouting works which may displace the mine gas and force it to the surface.
- Degradation of below ground infrastructure due to direct contact with contaminated soils/groundwater.

9.4. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION

9.4.1. It is anticipated that the appropriate Mitigation Measures, including but limited to the following will be included in the environmental actions and commitments (REAC) and delivered during the construction phase via the Construction Environmental Management Plan (CEMP), which will be secured as part of the DCO requirements:

- Earthworks would be completed in accordance with a Contaminated Land: Applications in Real Environments (CL:AIRE) compliant Materials Management Plan (MMP) to ensure re-used material does not present a risk to human health or the environment and complies with UK waste legislation regulations;
- Incorporation of a temporary surface water drainage strategy to limit any contaminated run-off entering surrounding surface watercourses;
- Shallow coal mining related stability issues to be assessed and addressed in line with best practice guidance (CIRIA C758D Abandoned Mine Workings Manual) (**Ref. 9-5**) that is accepted by the Coal Authority;
- Subject to the findings of the intrusive ground investigation, a suitable remediation strategy will be formulated and agreed with Cheshire West and Chester Council and Flintshire County Council prior to being implemented to mitigate unacceptable contaminated land related risks in the context of the Study Area; and
- Appropriate measures to limit contaminations to the ground from construction related plant/machinery and storage of materials to be incorporated within a Construction Environmental Management Plan.

OPERATION

9.4.2. To mitigate any potential operational effects, the drainage design for the AGI will include oil water interceptors around highway areas to prevent contamination from migrating toward sensitive surface water courses.

9.5. DESCRIPTION OF LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION

9.5.1. The likely significant effects associated with the Construction Phase will relate to:

- Disturbance and/or temporary loss of agricultural land including BMV soil;
- Exposing construction staff to contaminated dust and soil particulates during construction related earthworks activities;
- Mobilising existing contamination in groundwater as a result of ground disturbance and de-watering and creating preferential migration pathways for contaminants to reach sensitive receptors (e.g. along pipeline or new service trenches);
- Introduction of new sources of contamination to the ground, such as fuels and oils used in construction plant, associated with any spillages and leaks; and
- Release of hazardous mine gas and subsequent accumulation within confined spaces associated with disturbing and potentially grouting coal mining related voids.

Operation

- Loss of agricultural land including best and most versatile soils.
- Changes in site levels may result in existing contaminants that were previously present at depth and therefore unlikely to interact with the identified receptors, now being present at the surface where they could pose unacceptable risks to future site users.
- Damage to cables and pipes from ground contaminants.

9.5.2. The impacts scoped in or out for the land and soils assessment are presented in **Table 9-1.**

Table 9-1: Elements Scoped in or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Contaminated soil and detriment to Human Health	Construction	✔		Potential for construction staff to be exposed to contaminants in the ground (particularly in areas currently/ formerly used for industrial purposes) posing potential health related impacts, and subject to the contaminants the effects could be significant.
	Operation		✔	Contaminated land pathways to human health to be addressed via a Remediation Strategy and incorporated as part of the construction phase, thereby leaving the site 'suitable for use' from a contaminated land perspective as part of the operational phase.
Controlled Water Body Contamination	Construction	✔		Potential for contaminants to be mobilised and impact sensitive controlled water receptors. Potentially significant effects subject to the mobility and contaminant concentrations.
	Operation		✔	No contaminated land source-pathway-receptors linkage identified as part of the operational phase.
Hazardous Ground Gas or Mine Gas to accumulate within confined spaces	Construction and Operation	✔		Potential for works to create additional pathways to allow hazardous gas (e.g. methane and carbon dioxide) to accumulate within underground chambers / pipeline runs or pipeline support infrastructure or migrate towards properties in the event that voids are grouted to stabilise the features posing potentially significant effects to both property and human occupants.
Agricultural / sensitive soil	Construction and Operation	✔		Potential temporary and permanent loss of Grade 3a BMV soil.
Mineral Safeguarding Areas	Construction and Operation	✔		Potential sterilisation of sand and gravel extractions site. In accordance with *Chester and Cheshire West Local Plan M2: Mineral Safeguarding Areas* the Proposed Development will be required to comply with requirements regarding prior extraction.
Built Environment – detriment of pipes and cables from aggressive ground contaminants over time.	Construction		✔	Insufficient time for contaminants to impact pipe/ducting materials during the construction phase of the Proposed Development.
	Operation	✔		Potential for contaminants in the ground to impact (damage) pipe and cable material over time.

9.6. OPPORTUNITIES FOR ENHANCING THE ENVIRONMENT

9.6.1. The opportunities for land and soil related enhancement measures are relatively limited; however, should the ground investigation identify a requirement for remediation of soils and or groundwater, then a level of enhancement in the soil quality will be facilitated by the works.

9.6.2. In addition, where possible, the design will look to incorporate any excess arisings within the Proposed Development rather than off-site disposal.

9.7. PROPOSED ASSESSMENT METHODOLOGY

BASELINE DATA GATHERING

9.7.1. Baseline conditions will be informed by a Phase I Preliminary Desk Study report and targeted Agricultural Land Classification (ALC) Survey. The Desk Study report will utilise publicly available data, primarily from a Groundsure Report including historical Ordnance Survey maps and contaminated land related data. Information on geology will be sourced from the Multi-Agency Geographic Information for the Countryside (MAGIC) website (**Ref. 9-2**) and the Coal Authority website (**Ref. 9-6**).

9.7.2. A site reconnaissance visit will be undertaken to inspect the site for potential sources of contamination and gain further details on sensitive receptors. The ALC survey will target areas of agricultural land which may be classified as BMV.

9.7.3. An intrusive ground investigation is to be undertaken to inform final project design prior to final ES completion and will provide pertinent site-specific data to further refine the baseline conditions, particularly with regard to the presence of contamination in soils/ groundwater quality.

CONSULTATION

9.7.4. Information provided by relevant statutory bodies and interested parties during the construction process for the Proposed Development will be reviewed and included, where appropriate. This will include the following:

- Cheshire West and Chester Council, England;
- Flintshire County Council, Wales;
- The Coal Authority;
- Natural Resources Wales; and
- Natural England.

ASSESSMENT METHODOLOGY

9.7.5. A detailed assessment of land and soil will be undertaken in accordance with DMRB document LA 109 Geology and Soils (2019) (**Ref. 9-7**) covering the elements as set out in **Table 9-1.**

9.7.6. The detailed elements will include:

- Review baseline soil, geological and environmental information for the Scheme, including historical mapping, to enable an assessment of potential impacts associated with land contamination;
- Undertake detailed site survey;
- Review ground investigation chemical data and logs to confirm attribute importance and facilitate;
- assessment of potential contaminant linkages, as required;
- List and assess potential impacts;
- Assess the sensitivity of the attributes; and
- List and assess the likely significance of effects.

9.7.7. The assessment will be based upon DMRB LA 109 (**Ref. 9-7**) and LA 104 (**Ref. 9-8**) which present guidance on the methodology for assessing the value / sensitivity of the receptor and the magnitude of the impact.

9.7.8. Assessment procedures contained within BS10175:2011 (**Ref. 9-9**) and Environment Agency guidance Land Contamination: Risk Management LCRM (**Ref. 9-10**), including an assessment of risk classification for the source-pathway-receptor protocol based on CIRIA C552, will be used in a phased approach to inform the sensitivity of the receptor and the magnitude of the impact.

9.7.9. The criteria for determining the magnitude of identified impacts, the sensitivity of receptors and the significance of the resulting effects presented in **Tables 9-2 to 9-4** below.

Table 9-2: Magnitude of Impact

Magnitude	Criteria
Major	Geology: loss of geological feature / designation and/or quality and integrity, severe damage to key characteristics, features or elements. Soil: physical removal or permanent sealing of soil resource or agricultural land. Contamination:

Magnitude	Criteria
	1) human health: significant contamination identified. Contamination levels significantly exceed background levels and relevant screening criteria. 2) surface water and groundwater: use relative sensitivity in water environment in LA113.
Moderate	Geology: partial loss of geological feature / designation, potentially adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements. Soils: permanent loss / reduction of one or more soil function(s) and restriction to current or approved future use (e.g. through degradation, compaction, erosion of soil resource.) Contamination: 1) human health: contaminant concentrations exceed background levels and are in line with limits of relevant screening criteria. Significant contamination can be present. Control / remediation measures are required to reduce risks to human health / make land suitable for intended use; 2) surface water and groundwater: use relative sensitivity in water environment in LA113.
Minor	Geology: minor measurable change in geological feature / designation attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements. Soils: temporary loss / reduction of one or more soil function(s) and restriction to current or approved future use (e.g through degradation, compaction, erosion of soil resource.) 1) human health: contaminant concentrations are below relevant screening criteria. Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks to human health; 2) surface water and groundwater: use relative sensitivity in water environment in LA113.
Negligible	Geology: very minor loss or detrimental alteration to one or more characteristics, features or elements of geological feature / designation. Overall integrity of resource not affected.

Magnitude	Criteria
	Soils: no discernible loss / reduction of soil function(s) that restrict current or approved future use. Contamination: 1) human health: contaminant concentrations substantially below levels outlined in relevant screening criteria. No requirement for control measures to reduce risks to human health / make land suitable for intended use; 2) surface water and groundwater: use relative sensitivity in water environment in LA113.
No Change	Geology: no temporary or permanent loss / disturbance of characteristics features or elements. Soils: no loss / reduction of soil function(s) that restrict current or approved future use. Contamination: 1) human health: reported contaminant concentrations below background levels; 2) surface water and groundwater: use relative sensitivity in water environment in LA113.

Table 9-3: Sensitivity Criteria

Sensitivity	Description
Very High	Geology: very rare and of international importance with no potential for replacement (e.g. UNESCO World Heritage Sites, UNESCO Global Geoparks, SSSI's and GCR where citations indicate features of international importance). Geology meeting international designation citation criteria which is not designated as such. Contamination: 1) Human health - very high sensitivity land e.g. residential or allotments. 2) surface water: watercourse having Good WFD classification or designation under EC or UK legislation; and 3) groundwater: Principal Aquifer located within SPZ1. Soils:

Sensitivity	Description
	1) soils directly supporting an EU designated site (e.g. SAC, SPA, Ramsar); and / or 2) ALC grade 1 & 2 or LCA grade 1 & 2
High	Geology: rare and of national importance with little potential for replacement (e.g. geological SSSI, ASSI, National Nature Reserves (NNR)). Geology meeting national designation citation criteria which is not designated as such. Contamination: 1) High sensitivity land use such as public open space. 2) Surface water: Watercourse having Moderate WFD classification; and, 3) Groundwater: Principal Aquifer located within SPZ2. Soils: 1) soils directly supporting a UK designated site (e.g SSSI); and / or 2) ALC grade 3a, or LCA grade 3.1.
Medium	Geology: of regional importance with limited potential for replacement (e.g. RIGS). Geology meeting regional designation citation criteria which is not designated as such Contamination: – 1) Medium sensitivity land use such as commercial or industrial. 2) Surface waters: watercourse not having WFD classification linking to a WFD watercourse within 100m; and, 3) Principal Aquifer located within SPZ3. Soils: 1) soils supporting non-statutory designated sites (e.g. Local Nature Reserves (LNR), LGS's, Sites of Nature Conservation Importance (SNCIs)); and / or 2) ALC grade 3b or LCA grade 3.2.
Low	Geology: of local importance / interest with potential for replacement (e.g. non designated geological exposures, former quarry's / mining sites). Contamination: –

Sensitivity	Description
	1) Low sensitivity land use such as highways and rail. 2) Surface waters - watercourse not having WFD classification linking to a WFD watercourse within 250m; and, 3) Unproductive stratum. Soils: 1) ALC grade 4 & 5 or LCA grade 4.1 to 7; and / or 2) soils supporting non-designated notable or priority habitats.
Negligible	Geology: no geological exposures, little / no local interest. Contamination: 1) Undeveloped surplus land / no sensitive land use proposed. 2) Surface water: no surface water courses located within 250m; and, 3) Ground water: no pathway to underling aquifer. Soils: Previously developed land formerly in 'hard uses' with little potential to return to agriculture.

Table 9-4: Significance Matrix

	Magnitude of Impact					
		No change	Negligible	Minor	Moderate	Major
Sensitivity	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

LEGISLATION AND POLICY

National Policy

9.7.12. The National Planning Policy Framework (2019) (NPPF) (**Ref. 9-11**) states that the purpose of the planning system is to contribute to the achievement of sustainable development. The NPPF requires the planning system to contribute to and enhance the natural and local environment by protecting and enhancing geological and soils conservation interests. It also seeks to prevent new and existing development from contributing to or being put at unacceptable risk from soil or water pollution or land instability. It seeks to prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location.

9.7.13. Paragraph 170 (abridged) of the NPPF states the following:

Planning policies and decisions should contribute to and enhance the natural and local environment by:

a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and

f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

9.7.14. Paragraph 178 of the NPPF states that planning policies and decisions should ensure that:

'A) A site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);

B) After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and,

C) Adequate site investigation information, prepared by a competent person, is available to inform these assessments.'

9.7.15. Paragraph 179 of the NPPF states that where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.

9.7.16. The NPPF seeks to contribute to and enhance the natural and local environment by protecting and enhancing valued landscapes, geology conservation interests and soils. In addition, geology and geomorphological features which are considered to be of national importance are designated as Sites of Special Scientific Interest (SSSI) and have some level of legal protection.

9.7.17. The National Policy Statement (NPS) for energy (EN-1) is part of a suite of NPSs issued by the Secretary of State for Energy an Climate Change. It sets out the Government's policy for delivery of major energy infrastructure.

9.7.18. A further NPS for gas supply infrastructure and gas and oil pipelines (EN-4) will be considered during the Proposed Development. Section 2.23 details the potential impacts on soil and geology and details the requirements to assess the soil types, nature of the underlying strata, underground cavities and unstable ground, sterilisation of mineral resources and loss of soil quality.

Local Policy

9.7.19. The Chester and Cheshire West local plan (**Ref. 9-12**) sets out the local council vision for the region and includes local planning policy which will require considered during the Proposed Development:

9.7.20. Planning Policy EN3, EN4, EN7 and EN9 set out the councils view on green infrastructure, biodiversity and geodiversity, alternative energy supplies and mineral resources:

9.7.21. EN3 Green Infrastructure:

The Local Plan will support the creation, enhancement, protection and management of a network of high quality multi-functional Green Infrastructure. This will be achieved by:

Development incorporating new and/or enhanced Green Infrastructure of an appropriate type, standard and size or contributing to alternative provision elsewhere.

Increased planting of trees and woodlands, particularly in urban areas and the urban fringe.

9.7.22. EN4 Biodiversity and geodiversity:

The Local Plan will safeguard and enhance biodiversity and geodiversity through the identification and protection of sites and/or features of international, national and local importance.

Sites will be protected from loss or damage taking account of:

- *The hierarchy of designations of international, national and local importance.*
- *The irreplaceability of habitats, sites and/or features and contribution to the borough's ecological network of sites and features*
- *Impact on priority habitats and protected/priority species*
- *Development should not result in any net loss of natural assets and should seek to provide net gains. Where there is unavoidable loss or damage to habitats, sites or features because of exceptional overriding circumstances, mitigation and compensation will be required to ensure there is no net loss of environmental value.*

9.7.23. EN7 Alternative energy supplies:

The Local Plan will support renewable and low carbon energy proposals where there are no unacceptable impacts on:

- *Landscape, visual or residential amenity*
- *Noise, air, water, highways or health*
- *Biodiversity, the natural or historic environment*
- *Radar, telecommunications or the safety of aircraft operations*

Proposals should be accompanied by appropriate arrangements for decommissioning and reinstatement of the site when its operational lifespan has ended.

Development proposals that could feasibly supply or connect into a district heating network will be encouraged to do so.

Proposals to exploit the borough's alternative hydrocarbon resources will be supported in accordance with the above criteria and all other policies within the Local Plan.

9.7.24. EN9 Minerals supply and safeguarding

Cheshire West and Chester will make provision for the adequate, steady and sustainable supply of sand, gravel, salt and brine, contributing to the sub-national guidelines for aggregate land-won sand and gravel, whilst ensuring the prudent use of our important natural finite resources.

This will be achieved by:

- *Maintaining a minimum seven year landbank for aggregate land-won sand and gravel, making provision for a steady and adequate supply over the Plan period in line with national policy and Local Aggregate Assessments, providing a flexible approach to the location of future minerals development to ensure a diversity of supply for the market. Specific sites and preferred areas will be identified within the Local Plan (Part Two) Land Allocations and Detailed Policies Plan for the future extraction of aggregate land-won sand and gravel as either extensions to existing sites or new sites*
- *Safeguarding Cheshire West and Chester's extent of finite natural resources and associated infrastructure from incompatible development by delineating Mineral Safeguarding Areas for sand and gravel, salt and shallow coal, as shown on the Policies Map, together with existing and potential sites for minerals infrastructure*
- *Supporting proposals which enable the use of secondary and recycled mineral resources, reducing the reliance on primary aggregate extraction where appropriate*
- *Supporting the retention of and proposals for fixed construction, demolition and excavation waste recycling sites in appropriate locations across the borough*
- *Supporting environmentally acceptable proposals which enable the use of locally sourced building stone for architectural and heritage purposes*
- *Ensuring the sustainable and prudent use of all natural mineral resources, including salt and brine, whilst having regard to the need to contribute to the provision of nationally significant gas storage capacity*
- *Requiring all proposals for minerals development to include high quality restoration and aftercare proposals in keeping with surrounding land uses*

Relevant Guidance and Legislation

9.7.25. **Chapter 4: EIA Methodology** of this scoping report sets out the overarching methodology and guidance documents relevant to the Proposed Development.

9.7.26. The following national legislation and guidance will form the main considerations relevant to the land and soils assessment:

- Environmental Protection Act, 1990 (Part IIA deals with the identification and remediation of contaminated land) (applicable in England and Wales).
- Contaminated Land Regulations (England), 2006 (amended 2012) (these regulations apply to England only).
- Environment Act 1995;
- Control of Substance Hazardous to Health Regulations 2002;
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017;
- Environmental Damage (Prevention and Remediation) (England) Regulations 2015;
- The Environmental Permitting (England and Wales) Regulations 2016;
- Control of Asbestos Regulations (CAR) 2012;
- Construction (Design & Management) Regulations (CDM), 2015

9.7.27. The following guidance documents will also be used during the preparation of the Environmental Chapter:

- Health and Safety Executive (HSE) (1991) Guidance Note HS(G)66, Protection of Workers and the General Public during the Development of Contaminated Land (**Ref. 9-13**);
- Environment Agency (2020) Land Contamination Risk Management (LCRM) (**Ref. 9-14**);
- CIRIA C552 (2001), Contaminated Land Risk Assessment: A guide to good practice (**Ref. 9-15**);
- CIRIA C532 (2001) Control of Pollution from Construction Sites (**Ref. 9-16**);
- Environment Agency and NHBC (2008) Guidance for the safe development of housing on land affected by contamination, Environment Agency R&D Publication 66(**Ref. 9-17**);
- BS 10175 (2011) Investigation of Potentially Contaminated Sites – Code of Practice (**Ref. 9-9**);
- Department for Environment, Food and Rural Affairs (DEFRA), Contaminated Land Statutory Guidance April 2012(**Ref. 9-18**);
- Environment Agency (2017) Groundwater Protection (**Ref. 9-19**);

- British Standards Institute (BSI) BS 5930 (2015) The Code of Practice for Site Investigations (**Ref. 9-20**); and,
- Design Manuals for Roads and Bridges 104 (Environmental Assessment and Monitoring), 109 (Geology and Soils), 110 (material assets and waste) and 113 (Road drainage and the water environment) (**Ref. 9-7** and **9-8**).

9.7.28. The following Planning Practice Guidance are considered relevant and will be consulted during the Environmental Chapter:

- Land affected by contamination (July 2019) – outlines the system for identifying and remediating contaminated sites;
- Natural Environment (July 2019) – Section 3 deals with the ecological value placed on brownfield land, and outlines why it is important to consider pollution in soil; and,
- Water supply, wastewater and water quality (July 2019) - outlines why water supply, wastewater and water quality are an important consideration when during development.

9.8. LIMITATIONS AND ASSUMPTIONS

9.8.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- There is a lack of understanding of current ground conditions. It is assumed that a ground investigation will be undertaken to inform the geology and soils assessment, outline design and the planning process.
- At the time of writing, there has been limited consultation with statutory consultees. Any commentary associated with the scope will be incorporated prior to completion of the PEIR and ES.
- Should any ground investigation be completed by a third party WSP will assume the data is wholly accurate. WSP cannot and will not accept liability for incorrect third-party data.
- Upon receipt of third-party data WSP will re-assess the potential source-pathways-receptors likely to be impacted.

9.9. REFERENCES

- **Ref. 9-1** R&D66 (Guidance for the Safe Development on Contaminated Land, Volume 1, 2008)
- **Ref. 9-2:** MAGIC
- **Ref. 9-3**: CRANFIELD
- **Ref. 9-4**: Coal Authority Interactive Map viewer (viewed 16 March 2021 https://mapapps2.bgs.ac.uk/coalauthority/home.html)

- **Ref 9-5**: CIRIA C758D Abandoned Mine Workings Manual
- **Ref. 9-6**: Coal Authority website (http://mapapps2.bgs.ac.uk/coalauthority/home/html)
- **Ref. 9.7:** DMRB LA 109 LA 109 - Geology and soils - DMRB (standardsforhighways.co.uk)
- **Ref. 9.8:** LA 104 LA 104 - Environmental assessment and monitoring - DMRB (standardsforhighways.co.uk)
- **Ref. 9.9:** BS10175:2011 'Investigation of potentially contaminated sites. Code of practice'
- **Ref. 9.10:** Environment Agency guidance Land Contamination: Risk Management LCRM Land contamination risk management (LCRM) - GOV.UK (www.gov.uk)
- **Ref. 9.11:** National Planning Policy Framework - Guidance - GOV.UK (www.gov.uk)
- **Ref. 9.12:** Cheshire West and Cheshire Council, Local Plan, Part Two: Land Allocations and Detailed Policies, Publication Date November 2017.
- **Ref. 9.13:** Health and Safety Executive (HSE) (1991) Guidance Note HS(G)66, Protection of Workers and the General Public during the Development of Contaminated Land;
- **Ref. 9.14:** Environment Agency (2020) Land Contamination Risk Management (LCRM);
- **Ref. 9.15:** CIRIA C552 (2001), Contaminated Land Risk Assessment: A guide to good practice;
- **Ref. 9.16:** CIRIA C532 (2001) Control of Pollution from Construction Sites;
- **Ref. 9.17:** Environment Agency and NHBC (2008) Guidance for the safe development of housing on land affected by contamination, Environment Agency R&D Publication 66;
- **Ref. 9.18:** Department for Environment, Food and Rural Affairs (DEFRA), Contaminated Land Statutory Guidance April 2012;
- **Ref. 9.19:** Environment Agency (2017) Groundwater Protection;
- **Ref. 9.20:** British Standards Institute (BSI) BS 5930 (2015) The Code of Practice for Site Investigations.

10. LANDSCAPE AND VISUAL

10.1. INTRODUCTION

10.1.1. This Chapter considers the impact of the Proposed Development on landscape character and visual amenity. It sets out the proposed study area and identifies the baseline landscape character areas, landscape designations and visual receptors that are anticipated to be potentially significantly affected by the Proposed Development.

10.2. STUDY AREA

10.2.1. The Guidelines for Landscape and Visual Impact Assessment (GLVIA 3) (**Ref. 10-1**) clarify how study areas should be determined on a project specific basis. Paragraph 5.2 of GLVIA 3 states that the study area extent should be *"… based on the extent of Landscape Character Areas likely to be significantly affected either directly or indirectly*" or "*on the extent of the area from which the development is potentially visible, defined as the Zone of Theoretical Visibility, or a combination of the two.*"

10.2.2. For the purposes of this assessment, the initial Study Area for assessing potentially significant landscape and visual effects is proposed to be a maximum 2km radius from the Newbuild Infrastructure Scoping Boundary incorporating the proposed pipeline route/s and Above Ground Installations (AGI). For the four Block Valve Stations (BVS) along the existing natural gas Flint-PoA pipeline, a maximum 500m radius is considered appropriate to capture any potentially significant landscape and visual effects during the construction and operation effects. The BVS would be consist of a small compound where a maximum 3m high fence would be the tallest element. This is based on a combination of professional judgement and an initial analysis of the potential height and extent of the Proposed Development, as defined in **Chapter 3: Description of the Proposed Development**.

10.2.3. This initial Study Area could be refined further in agreement with Natural Resources Wales (NRW), Natural England (NE), Flintshire County Council (FCC), Cheshire West and Chester Council (CWCC), the Canals & River Trust, and other relevant bodies following design development stages when heights, extent and location of structures are confirmed.

10.3. BASELINE CONDITIONS

10.3.1. To establish the baseline, a combination of desktop study, initial walkover of the area, and preliminary Zone of Theoretical Visibility (ZTV) have been carried out. The baseline section is split into two sections covering landscape character and visual amenity.

LANDSCAPE CHARACTER

10.3.2. As shown on **Figure 10-2** in **Appendix A: Figures**, the Proposed Development spans across NRW's National Landscape Character Area NCLA 12: Clwydian Range; NLCA 13: Deeside; and Wrexham and NE's National Character Areas NCA 59 Wirral, NCA 60 Mersey Valley and the northern part of NCA 61 Shropshire, Cheshire and Staffordshire Plain.

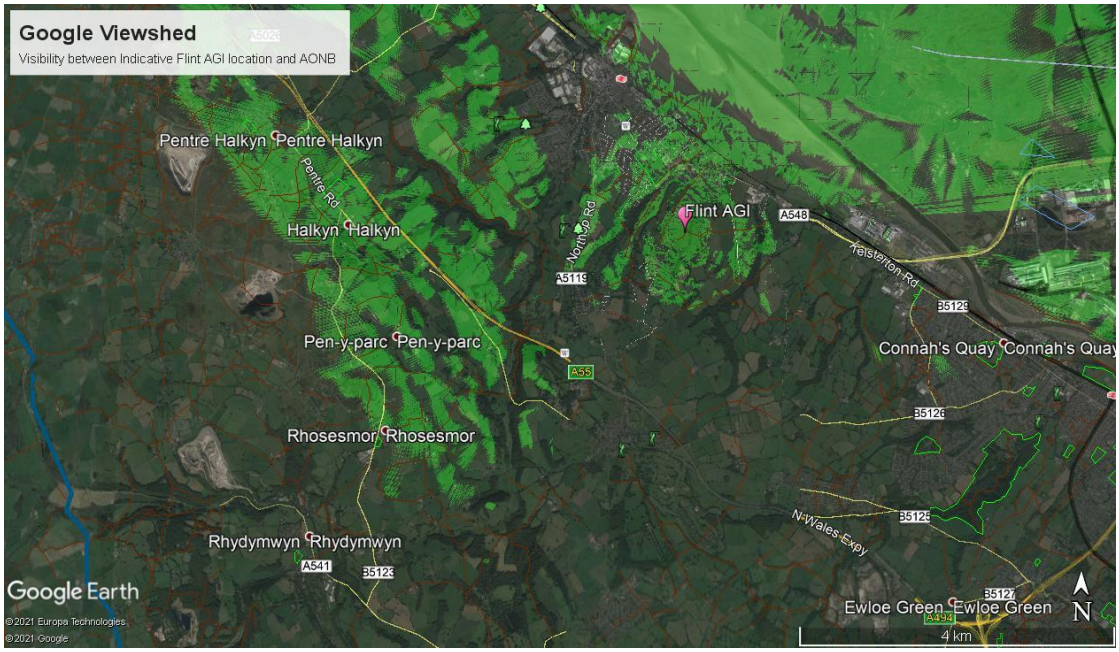
10.3.3. At a local level it either passes through or lies adjacent to approximately 17 Visual and Sensory aspect areas based on LANDMAP and Landscape Character Areas 9a, 9d and 15i of CWCC's '*A Landscape Strategy for Cheshire West and Chester Borough*' 2016.

10.3.4. Overall, the landscape can be described as varied, ranging from gently undulating in the west around Connah's Quay to flat further east towards Ellesmere Port. Hedgerows and hedgerow trees or drainage ditches with limited pockets of woodland are a characteristic of the landscape. Industrial development to the north of the Newbuild Infrastructure Scoping Boundary is notable, as well as the numerous settlements transitioning to rural pasture or arable land. A dense communication network of motorways, roads, railways, canals and rivers exist including the M56, Shropshire Union Canal and the River Dee.

10.3.5. Outside of the 2km Study Area sits the Clwydian Range and Dee Valley Area of Outstanding Natural Beauty (AONB). At its closest point, the AONB sits approximately 3km from the Newbuild Infrastructure Scoping Boundary, specifically the indicative Pentre Halkyn BVS. Given this is a nationally important designation, a review on potential inter-visibility was carried out using the Google viewshed Tool. **Figure 10-2** below shows an extract of the potential inter-visibility with the Proposed Development from the closest AGI at Flint, located approximately 8.4km from the AONB (AONB boundary shown with blue line.) This assumes a worst-case scenario of approximately 9m high AGI within an indicative area within the Newbuild Infrastructure Scoping Boundary. The area shown in green demonstrates visibility in the area and illustrates that there would be no visibility from the AONB.

10.3.6. The AONB is 3km at closest from the nearest BVS, and whilst it is acknowledged they may be visible in views from some parts of the AONB, owing to the small scale and nature of the BVS, it is considered that they would not have the potential to cause significant effects on the special qualities of the AONB.

Figure 10-2 - Extract of Google Viewshed Tool



VISUAL AMENITY

10.3.7. In order to understand where the Proposed Scheme will be visible from, a preliminary ZTV has been prepared using OS Terrain 5 DTM - bare earth data showing heights at 3m, 6m and 9m to allow for the range heights of Proposed Developments above ground equipment as shown on **Figure 10-4.**

10.3.8. In terms of visual receptors (people with views), the Proposed Development will be overlooked by a number of settlements and Public Rights of Way with several crossing the carbon dioxide pipeline route corridor. The Wales Coastal Path also cuts across the carbon dioxide pipeline route corridor further west.

10.3.9. Based on review of the ZTV, followed by an initial site visit, visual receptors have been identified and will be represented by a series of proposed viewpoints. **Figure 10-3: Viewpoint Plan** in **Appendix A: Figures** shows the key visual receptors in which photo viewpoints have been taken to represent views from people in sensitive locations, such as houses and footpaths. These are shown in **Table 10-1**. Viewpoints around the BVS along the Flint-PoA pipeline are indicative and are to be confirmed following Site Visits.

Table 10-1: Viewpoint Locations

Ref	Viewpoint Name	Grid Ref
Wales AGI Viewpoints (Flint)		
WAGI1	Cwm Eithion, Flint	SJ 24872 71638
WAGI2	Llwyn Onn, Flint	SJ 25060 71159
WAGI3	Allt-Goch Lane (north), Flint	SJ 25214 71002
WAGI4	Allt-Goch Lane (south), Flint	SJ 24932 70542
WAGI5	Flint, Flintshire	SJ 25237 71798
WAGI6	Oakenholt, Flint	SJ 25907 71412
WAGI7	Tros-y-mynydd, Starkey Lane, Northop	SJ 25235 70080
England AGI Viewpoints (Grinsome Road and Alcohols Site)		
EAGI1	Marsh Lane, Ince, Elton	SJ 46514 76616
EAGI2	Rake Lane, Frodsham, Helsby	SJ 47829 76837
EAGI3	Straight Length, Netherton, Frodsham	SJ 49935 77621
EAGI4	Poole Lane, Thornton-le-Moors	SJ 44430 74777
EAGI5	Ash Road, Elton	SJ 46282 75320
EAGI6	Mount Pleasant, Elton	SJ 45505 75802

Ref	Viewpoint Name	Grid Ref
EAGI7	Elton Green, Elton	SJ 45119 75387
EAGI8	Meadow View, Elton Green, Elton	SJ 45231 75247
EAGI9	Yew Tree Close, Thornton-le-Moors	SJ 44390 74506
Carbon Dioxide Pipeline Viewpoints		
P1	North Wales Expressway, Northop Hall, Northop	SJ 25271 68531
P2	Saint Mary's Drive, Northop Hall	SJ 26982 67517
P3	Green Lane, Hawarden, Ewloe	SJ 28852 66636
P4	Moorfield Road, Hawarden, Aston	SJ 30708 66969
P5	Vickers Close, Hawarden, Shotton	SJ 31340 67112
P6	Chester Road East, Queensferry, Sandycroft	SJ 33255 66778
P7	Prince William Avenue, Queensferry, Sandycroft	SJ 34615 67291
P8	B5129, Saltney Ferry, Saltney	SJ 36736 65832
P14	Oil Pipeline Bridge, Wervin	SJ 41785 71841
Carbon Dioxide Pipeline Viewpoints (Southern Corridor Only)		
P9	Chester Millennium Greenway (east), Sealand	SJ 35885 68960

Ref	Viewpoint Name	Grid Ref
P10	The Peg, Hermitage Road, Saughall	SJ 36640 69473
P11	Mollington Court, Townfield Lane, Mollington	SJ 38331 70525
P12	Gypsy Lane, Mollington	SJ 38532 70927
P13	A41, Moston	SJ 40044 70964
P15	Meadow View, Picton Lane, Picton	SJ 43361 71600
Carbon Dioxide Pipeline Viewpoints (Northern Corridor Only)		
Pa1	A494, Sealand Manor, Sealand, Garden City	SJ 32483 68600
Pa2	Chester Millennium Greenway (west), Sealand	SJ 34621 69457
Pa3	Lodge Lane, Saughall	SJ 36246 70650
Pa4	Demage Lane, Lea-by-Backford	SJ 38695 71749
Pa5	Gordon Lane, Chorlton, Backford	SJ 39916 72276
Pa6	M53, Wervin, Stoak	SJ 42374 72072
Block Valve Station Viewpoints (indicative)		
B1	Plas-newydd, Babell Road (east of Babell BVS)	SJ 15279 74709
B2	Cross Roads at B5121 and Fford Babell (south of Pentre Halkyn BVS)	SJ 17316 73144

Ref	Viewpoint Name	Grid Ref
B3	Lleprog Farm, Lleprog Lane (north of Cornist Lane BVS)	SJ 21723 72738
B4	Cornist Ganal or Sylfaen Farm off Cornist Lane (adjacent to Coed-y-Cra BVS)	SJ 22505 72222

10.4. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

10.4.1. As an inherent part of the design process, landscape and visual effects will be considered in relation to the Proposed Development.

10.4.2. Key areas for mitigation include those associated with the localised placement of AGIs and BVS, together with any screening. The avoidance of loss and/or replacement of any vegetation loss along the carbon dioxide pipeline corridors, in particular hedgerow and tree planting pertinent to landscape character will be part of the iterative design process.

10.4.3. Depending on the final details of the Proposed Development, landscape and habitat mitigation and/or enhancements on and offsite is a potential consideration.

10.5. DESCRIPTION OF LIKELY SIGNIFICANT EFFECTS

10.5.1. The impacts scoped in or out of the LVIA are presented in **Table 10-2**.

Table 10-2: Elements Scoped In or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Landscape and visual impacts arising from Existing Pipeline Works (excluding Block Valve Stations)	Construction Operation		✔	No physical works consented within this Application. Therefore, no impact pathways relevant to landscape and visual.
Changes to landscape character within the Newbuild Infrastructure Scoping Boundary and Study Area due to construction activities and associated plant.	Construction	✔		The construction activities to build the Proposed Development have potential to create temporary and permanent effects on landscape features through activities such as the clearance of vegetation and structures to enable space for new buildings and structures. Temporary, short-term effects on landscape character potentially would occur from the presence and movement of construction plant and associated temporary construction infrastructure.
Changes to landscape character within the Newbuild Infrastructure Scoping Boundary and Study Area due to new built form, use of new infrastructure, and landscaping.	Operation	✔		The Proposed Development will introduce new permanent structures at the proposed AGI compounds and other above ground infrastructure (e.g. BVS) that will affect the existing (and future) baseline landscape character of the Site and Study Area.
Changes to existing visual amenity of surrounding sensitive receptors due to construction activities and associated plant.	Construction	✔		The construction activities to build the Proposed Development have potential to create temporary and permanent changes on visual amenity through vegetation clearance and other material removal. Temporary, short-term effects on visual amenity would also potentially occur from the presence and movement of construction plant and associated temporary construction infrastructure.
Changes in existing visual amenity of surrounding sensitive receptors due to new built form and landscaping.	Operation	✔		The Proposed Development will introduce new permanent structures at the proposed AGI compounds and other above ground infrastructure (e.g. BVS) that will affect the existing (and future) baseline landscape character of the Site and Study Area.
Clwydian Range and Dee Valley AONB	Construction and Operation		✔	Upon initial desktop review, the 2km study area is proportionate to the type of Proposed Development. The proposed Flint AGI (Northop Road) is located approximately 5.8km away from the nearest AONB and therefore outside the study area of the main proposed features. Following a review of the Google Viewshed Tool based on a maximum 9m height Proposed Development described above, it is clear there is no inter-visibility between the nearby AONB and the Proposed Development. In addition, the BVS are 3km away from the nearest AONB with a maximum height of 3m height (for fencing). The AONB is therefore scoped out of the assessment.
Receptors beyond 2km	Construction and Operation		✔	Upon initial desktop review and the following the site visit to identify sensitive visual receptors, the 2km Study Area is proportionate to the type of Proposed Development. Due the height of the Proposed Development and specific locations, the nature of the temporary effects of the carbon dioxide pipeline and the distance viewed, it is unlikely that receptors beyond 2km would experience significant effects. Receptors beyond 2km are therefore scoped out.

Element	Phase	Scoped In	Scoped Out	Justification
Receptors beyond 500m of the four BVS along the existing natural gas Flint-Point of Ayr pipeline.	Construction and Operation		✔	Upon initial desktop review, it is unlikely that there is potential for any significant effects beyond 500m of the BVS due to the limited height and extent of these proposed elements.

10.6. OPPORTUNITIES FOR ENHANCING THE ENVIRONMENT

10.6.1. Enhancement opportunities to strengthen soft landscape features which contribute to existing landscape character are possible at the AGI sites, other compounds for above ground infrastructure, and along the carbon dioxide pipeline routes.

10.7. PROPOSED ASSESSMENT METHODOLOGY

10.7.1. The LVIA would follow guidance described in 'The Guidelines for Landscape and Visual Assessment' (GLVIA) (**Ref. 10-1**) published by the Landscape Institute (LI) and the Institute of Environmental Management and Assessment (IEMA), 3rd Edition (2013). Additionally, guidance in 'An Approach to Landscape Character Assessment', Natural England (2014) (**Ref. 10-2**) would be followed, as well as Using LANDMAP in Landscape and Visual Impact Assessments GN46 (**Ref. 10-3**). Reference would also be made to relevant local planning policy documents, regional and local guidance including landscape character assessments as well as aerial photographs and Ordnance Survey data.

10.7.2. The final extent of the Study Area and number of viewpoints proposed will be proportionate to focussing on significant effects only. A ZTV of the tallest elements of the Proposed Development will be produced by computer modelling, based on the Ordnance Survey digital terrain model (DTM) and/or the Environment Agency LIDAR digital surface model.

10.7.3. On review of the desk top study, preliminary ZTV, and winter site walkover the proposed viewpoints and receptors represented are listed in **Table 10-1** above and illustrated on **Figure 10-3: Viewpoint Plan** in **Appendix A: Figures**.

10.7.4. The necessity for photomontages from agreed viewpoints will be determined in consultation with NRW, NE, FCC, CWCC, and the Canals & River Trust. All photographs and visualisations will be produced in line with Landscape Institute Technical Guidance Note (TGN) 06/19 (2019); 'Visual Representation of Development Proposals' (**Ref. 10-4**). Annotated photo-panoramas (to TGN 06/19 Type 1) or wirelines (to TGN 06/19 Type 2) of the Proposed Development would be produced for all viewpoints, and photomontages (to TGN 06/19 Type 3) for a selection of up to six viewpoints.

10.7.5. Section 5.9 of National Policy Statement EN-1 (**Ref. 10-5**) sets out generic considerations to be given to landscape and visual impacts which are in line with those set out in GLVIA described above. It states "*The assessment should include the visibility and conspicuousness of the project during construction and of the presence and operation of the project and potential impacts on views and visual amenity. This should include light pollution effects, including on local amenity, and nature conservation.*"

10.7.6. The need for assessment of the effects of lighting on visual amenity during the construction phases will be considered when details become available at a later stage. Section 2 of National Policy Statement EN-4 (**Ref. 10-6**) set out principles to be applied in the assessment and mitigation design specific to Gas and Oil Pipelines. The assessment and any mitigation design will incorporate these principles.

10.7.7. Cumulative effects with any other proposed development of a similar type within the Study Area will be considered in the assessment. **Chapter 17: Cumulative Effects** sets out the approach to identifying cumulative sites.

10.7.8. The significance of effect would be determined by combining the assessed sensitivity (derived from value of the receptor and susceptibility to the Proposed Development) of the landscape or visual receptor with the anticipated scale, extent and duration of impacts from the Proposed Development. Effects would be assessed for the construction phase, operational phase (year 1 or when changes are most obvious), and 15 years after commencement of operations when any mitigation planting if required would be considered to have matured to maximum effectiveness.

10.7.9. Landscape mitigation proposals would identify potential effects that could reasonably be mitigated through landscape design, and an assessment undertaken of the predicted significant of residual effects with reference to policy compliance. Plans illustrating landscape mitigation proposals will be prepared where necessary.

10.8. LIMITATIONS AND ASSUMPTIONS

10.8.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- As exact heights and massing of the Proposed Development are not confirmed at this stage, the proposed 2km Study Area and viewpoint locations may be subject to change and further refinement as the project progresses. It is currently based upon the scoping layout as shown in **Figure 3-1: Key Plan** in **Appendix A: Figures**.
- As the development design progresses and more project detail becomes available, adjustments and refinements will be made to the visual envelope. The current 2km Study Area for the Proposed Development is based on a combination of:
  - a preliminary ZTV (OS Terrain 5 DTM - bare earth data) showing heights at 3m, 6m and 9m to allow for the range heights of Proposed Developments above ground equipment as shown on **Figure 10-4: Preliminary ZTV** in **Appendix A: Figures**;

  - a winter survey capturing suitable viewpoint locations as shown on Figure 10-3: Viewpoint Plan in Appendix A: Figures; and
  - further desktop study with application of professional judgement.
- The assessment of the views from private properties is based on representative viewpoints from publicly accessible locations and professional judgement. A residential visual amenity survey is not proposed.
- Photography used to inform the assessment to date has been taken in March during the winter season. Any further viewpoints that may be requested or required will likely be taken during the Spring or Summer months or in winter where required where the programme allows.
- A Site visit and photography for the Flint-PoA Pipeline Block Valves is yet to be carried out and all assumptions to date are made by desktop study only.
- Photomontages in accordance with TGN 06/19 Type 3 are proposed for up to six viewpoints focussed around the AGIs only and will represent year 1 and year 15 of operation. Due to the temporary nature of the construction effects of the carbon dioxide pipeline and consequent underground nature during operation it is considered that photomontages are unnecessary. Other viewpoints will be produced as annotated photo-panoramas (Type 1) or wirelines (Type 2).
- The need for assessment of the effects of lighting on visual amenity during the construction phases will be considered when details become available.

10.9. REFERENCES

- **Ref. 10-1** The Guidelines for Landscape and Visual Assessment (GLVIA) Landscape Institute (LI) and the Institute of Environmental Management and Assessment (IEMA), 3rd Edition (2013).
- **Ref. 10-2** An Approach to Landscape Character Assessment, Natural England (2014)
- **Ref. 10-3** Natural Resources Wales / Using LANDMAP in Landscape and Visual Impact Assessments GN46
- **Ref. 10-4** Visual Representation of Development Proposals. Landscape Institute Technical Guidance Note 06/19 (2019)
- **Ref. 10-5** Overarching National Policy Statement for Energy (EN-1), Department of Energy & climate change (2011)
- **Ref. 10-6** National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4), Department of Energy & climate change (2011)

11. MAJOR ACCIDENTS AND DISASTERS

11.1. INTRODUCTION

11.1.1. This Major Accidents and Disasters (MA&D) Chapter provides consideration and high-level assessment of expected significant adverse effects of the Proposed Development on the environment deriving from the vulnerability of the Proposed Development to risks of either relevant major accidents and/or disasters.

11.1.2. Based on professional judgement, major accidents or disasters are events or situations that have the potential to affect the scheme causing immediate or delayed serious damage to one or more of the following: human health, welfare, and the environment. The assessment considers the risks of major accidents and disasters (hereafter referred to as MA&D Events) during construction and operation of the Proposed Development caused by natural hazards or manmade hazards (including operational failure).

11.1.3. The starting list of potential MA&D Event groups and categories to which the Proposed Development may be at risk of vulnerability during construction and operation phases considered in this Chapter are listed in Table 11-1.

Table 11-1: MA&D Event Groups and Categories

Groups	Category
Natural	Geophysical
	Hydrological
	Climatological and meteorological
	Space
	Biological
Technological or manmade hazards	Societal
	Industrial and urban accidents
	Transport accidents
	Pollution accidents
	Utility failures
	Malicious attacks
	Engineering accidents and failures

11.1.6. This Chapter should be read in conjunction with technical Chapters (**Chapters 5 to 10** and **12 to 17**) to provide a broader environmental context on the risks associated with these major event types. These Chapters also outline the proposed measures to prevent or mitigate significant effects and details of the preparedness for, and proposed response to emergencies.

11.1.7. The definition of key terms used in this chapter are given in Table 11-2. These definitions have been developed by reference to the definitions used in EU and UK legislation and guidance relevant to major accidents and/or disasters **Ref. 11-1 to 11-9** as well as professional judgement in the context of the Proposed Development.

Table 11-2: Key Terms and Definitions Relevant to this Chapter

Term	Definition
(Major) Accident	In the context of the Proposed Development, an event that threatens immediate or delayed serious damage to human health, welfare and/or the environment and requires the use of resources beyond those of the Applicant or its contractors to respond to the event. Serious damage includes the loss of life or permanent injury and/or permanent or long-lasting damage to an environmental receptor that cannot be restored through minor clean-up and restoration efforts. The significance of this effect will take into account the extent, severity and duration of harm and the sensitivity of the receptor.
Consultation Zone	The Health & Safety Executive (HSE) sets a Consultation Distance (CD) around major hazard sites and major accident hazard pipelines after assessing the risks and likely effects of major accidents at the major hazard site/pipeline. The area enclosed within the CD is referred to as the consultation zone. The Local Planning Authority is notified of this CD and has a statutory duty to consult HSE on certain proposed developments within the zone the CD forms.
Disaster	In the context of the Proposed Development, a naturally occurring phenomenon such as an extreme weather event (for example storm, flood, temperature) or ground-related hazard events (for example subsidence, landslide, earthquake) with the potential to cause an event or situation that meets the definition of a Major Accident as defined above.

Term	Definition
External Influencing Factor	A factor which occurs beyond the limits of the Proposed Development that may present a risk to the Proposed Development, e.g. if an external disaster occurred (e.g. earthquake, COMAH site major accident) it would increase the risk of serious damage to an environmental receptor associated with the Proposed Development.
Hazard	Anything with the potential to cause harm, including ill-health and injury, damage to property or the environment; or a combination of these.
Internal Influencing Factor	A factor which occurs within the limits of the Proposed Development that may present a risk to the Proposed Development.
Risk	The likelihood of an impact occurring combined with effect or consequence(s) of the impact on a receptor if it does occur.
Risk Event	An identified, unplanned event, which is considered relevant to the Proposed Development and has the potential to be a Major Accident and/or Disaster subject to assessment of its potential to result in a significant adverse effect on an environmental receptor.
Vulnerability	In the context of the 2014 EU Directive, the term refers to the 'exposure and resilience' of the Proposed Development to the risk of a major accident and/or disaster. Vulnerability is influenced by sensitivity, adaptive capacity and magnitude of impact.

11.2. STUDY AREA

11.2.1. The Study Area for MA&D Events has been developed based on professional judgement as there is no specific regulatory guidance nor significant precedent or standardised methodology. The following factors and associated distances were adopted for setting the Study Area in order to capture internal and external influencing factors which may have high adverse consequences on the Proposed Development:

- Manmade features:
  - Airports and airfields within 13km;
  - Control of Major Accident Hazard facilities within 3km;
  - Major accident hazard pipelines within 1km;

  - Fuel retail sites (including Liquified Natural Gas, Liquified Petroleum Gas) within 1km;
  - Rail infrastructure within 500m; and
  - Transmission (gas, electrical, oil/fuels) crossing the Proposed Development boundary.
- Natural features with the potential to create risks within:
  - 3km (chiefly hydrological and geological, for example dam failure and seismic activity respectively); and
  - 1km (chiefly hydrological and geological, for example flood risk and unstable ground conditions respectively).

11.2.2. The Study Area has been based primarily on information held by the Applicant and information developed as part of the Scoping Report by the WSP project team.

11.3. BASELINE CONDITIONS

11.3.1. The baseline relevant to this topic comprises:

- Features external to the Proposed Development that contribute a potential source of hazard to the Proposed Development;
- Sensitive environmental receptors at risk of significant effect; and
- Current (without the Proposed Development) major accident and disaster risks for the existing locality.

11.3.2. The baseline conditions described for MA&D Events are derived from the following desk study sources:

- National Risk Register of Civil Emergencies (**Ref. 11-10**)
- British Geological Survey 'Onshore GeoIndex' (**Ref. 11-11**);
- Tsunamis Hazard Map (**Ref. 11-12**);
- The International Disaster Database (**Ref.11-13**);
- Health and Safety Executive's Planning Advice Web App (**Ref. 11-14**);
- Health and Safety Executive's COMAH 2015 Public Information Search (**Ref. 11-15**);
- Google aerial and street view maps covering Study Area (**Ref.11-16**); and
- Technical chapters (**Chapters 5** to **10** and **12** to **17**).

11.3.3. Schedule 4 of the EIA Regulations 2017 (**Ref. 11-17**) advises the information to be included in an ES. As such, the scoping study has considered the following receptors:

- Members of the public and local communities;

- Infrastructure and the built environment;
- The natural environment, including ecosystems, land and soil quality, air quality, surface and groundwater resources and landscape;
- The historic environment, including archaeology and built heritage; and
- The interaction between the factors above.

11.4. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

11.4.1. This Chapter assumes that tertiary mitigation measures identified in each of the technical Chapters (**Chapters 5 to 10** and **12 to 17**) will be implemented for the Proposed Development in order to assess the magnitude of impact; these measures are reported and discussed in detail in the relevant technical chapters.

11.4.2. The Applicant has committed to constructing and managing the Proposed Development in accordance with, inter alia:

- Good engineering practice;
- Environmental, Health & Safety Management systems;
- Supplier management environmental, health & safety standards (e.g. Construction Skills Certification Scheme);
- Risk management systems; and
- Construction and Environmental Management systems (the draft Order will contain a requirement for a CEMP).

11.5. POTENTIAL VULNERABILITY TO MAJOR ACCIDENT AND DISASTER RISKS

11.5.1. The applicable legislative framework covering the design, construction and operation of the Proposed Development is summarised as follows:

- Health and Safety at Work etc. Act 1974 (HASWA) (**Ref. 11-18**);
- Construction (Design and Management) Regulations 2015 (CDM) (**Ref. 11-19**); and
- Pipeline Safety Regulations 1991 (SI 1996 No.825) (**Ref.11-7**).

11.5.2. There is no published guidance for the application of the legal requirements to the assessment of MA&D. However, selected relevant guidance for risk assessment methodologies is summarised as follows:

- Defra (2011) 'Guidelines for Environmental Risk Assessment and Management (**Ref. 11-3**);
- Chemical and Downstream Oil Industries Forum, (2013), Guideline – Environmental Risk Tolerability for COMAH Establishments (**Ref. 11-20)**; and

- The International Standards Organization's ISO 31000: 2009 Risk Management – principles and guidelines (**Ref. 11-21**).

11.5.3. Additionally, the following have been consulted to support the identification of potential MA&D:

- The Cabinet Office National Risk Register of Civil Emergencies (**Ref. 11-10**). This document is the unclassified version of the National Risk Register and it identifies the main types of civil emergencies that could affect the UK in the next five years. It is recognised, however, that this document does not provide an all-encompassing list of all potential accidents and disasters and its timescales are short term.
- The International Federation of Red Cross & Red Crescent Societies Early Warning, Early Action (2008) (**Ref. 11-2**). This guidance looks to other countries including those in warmer climates, thereby identifying risks that the UK may encounter in the future in light of climate change and global warming.
- The International Disaster Database (**Ref. 11-13**). This online source (http://www.emdat.be/) contains data covering over 22,000 mass disasters in the world since 1900 to the present day and aims to "*rationalise decision making for disaster preparedness, as well as provide an objective base for vulnerability assessment and priority setting*".

11.5.4. An initial review of the accident and disaster event groups, categories and types identified in the Study Area, has been undertaken to inform the scoping process, is reported in **Appendix B: MAD Screening Table** and summarised in **Table 11-3**. This table shows the potential vulnerability of the Proposed Development to the risk of a Major Accident and/or Disaster event at the type level. The ES will provide greater assessment and justification for the topic areas scoped in and for those that are scoped out no further assessment is considered necessary in the EIA.

Table 11-3: Elements Scoped In or Out of Further Assessment

Major Event Group	Major Event Category	Major Event Type	Basis of Decision to Scope In/Out	Scope In?
Natural Hazards	Geophysical	Earthquakes	Do not occur in Britain of a sufficient intensity owing to the motion of the Earth's tectonic plates causing regional compression. In addition, uplift from the melting of the ice sheets that covered many parts of Britain thousands of years ago can also cause movement. The BGS acknowledges that on average, a magnitude 4 earthquake happens in Britain roughly every two years and a magnitude 5 earthquake occurs around every 10 to 20 years. As such the Cabinet Office National Risk Register of Civil Emergencies states that "*Earthquakes in the UK are moderately frequent but rarely result in large amounts of damage. An earthquake of sufficient intensity (determined on the basis of the earthquake's local effect on people and the environment) to inflict severe damage is unlikely*". The Proposed Development is not in or close to an active area.	N
Natural Hazards	Geophysical	Volcanic Activity	The Proposed Development is not in an active area and it is highly unlikely that an ash cloud could significantly impact on any aspect of the Proposed Development.	N
Natural Hazards	Geophysical	Landslides	The Proposed Development's topography is mostly relatively flat or gently undulating land. Historical landslides have not been recorded within the boundary of the Proposed Development and the Proposed Development does not involve the formation of deep cuts/high embankments. In designing the Proposed Development to applicable standards, resources and receptors would not be put at a greater risk as a consequence of the Proposed Development.	N
Natural Hazards	Geophysical	Sinkholes	The superficial soils underlying the Proposed Development route include the following; Alluvium, Glacial Till (Diamicton), Peat, Glacial Sand and Gravel and Head Deposits. The bedrock geology that underlies the Proposed Development route includes various sandstone and shale formations, and coal measures rather than limestone. Therefore, the geology is unlikely to be prone to the natural formation of sinkholes. There are no examples of sinkholes in the locality of the Proposed Development to warrant taking this event forward.	N
Natural Hazards	Geophysical	Tsunamis	The Proposed Development is not located in a tsunamis risk zone.	N
Natural Hazards	Hydrology	Coastal Flooding	The floodplains of the Dee Estuary and River Gowy, as well as land east of Elton, are at risk of coastal/tidal flooding. The four Block Valve Stations (BVS) are all located within areas of land with a 0.1% (or less) chance of flooding each year from rivers or the sea. Their locations are within Zone A which is considered to be at little or no risk of fluvial or tidal/coastal flooding.	Y
Natural Hazards	Hydrology	Fluvial Flooding	The Proposed Development crosses Flood Zone 2 at five locations: the floodplains associated with Gale Brook, Thornton Brook East, River Gowy and tributaries, and the Dee Estuary. Flood Zone 2 is land assessed as having between 0.1% and 1 % chance of flooding any given year from rivers, or between 0.1% and 0.5% chance of flooding any given year from the sea. In Wales, the Proposed Development crosses Zone C2 (Areas of floodplain not benefitting from flood defences) in three locations: the Dee Estuary, Alltami Brook and Wepre Brook. There is land either side of the Dee Estuary which is located within Zone C1 (Areas of floodplain which are developed and benefitting from flood defences).	Y

Major Event Group	Major Event Category	Major Event Type	Basis of Decision to Scope In/Out	Scope In?
			The recorded flood outline shows that the following areas have previously flooded from fluvial or coastal sources: • Rural land west of Thornton le Moors (April 1971); • Knolls Bridge, Chester (January 1964); • Part of Deeside Industrial Estate (Date not published); • Land south east of Garden City (Date not published); • Land between Sandycroft and A5104 Chester Road (Date not published); and • Land at Ewloe Green (Date not published). In the location of the Proposed Development crossing of the Dee Estuary, the adjacent land is classed as an area benefitting from flood defences for flooding from the sea. These defences run along the edge of the Dee Estuary, Finchetts Drain, Border Drain and Sandycroft drain (upstream of Chester Road). There is also an area of Hawarden Airport which benefits from fluvial flood defences, likely associated with the Sandycroft Drain. There are also flood defences along the Mill Brook, River Gowy and its tributaries, and Gale Brook. These defences comprise of either high ground or embankments along the watercourses. As a result, the Essar Stanlow Refinery site is defined as an area benefitting from these defences. The four BVS Flint to Point of Ayr (PoA) pipeline route are all located within areas of land with a 0.1% (or less) chance of flooding each year from rivers or the sea. Their locations are within Zone A which is considered to be at little or no risk of fluvial or tidal/coastal flooding. The block valves at Coed-y-Cra, Cornist Lane and Pentre Halkyn are located within areas of very low risk of fluvial flooding, however they are located within 500m of high-risk areas. These areas are floodplains associated with the Afon Nant-y-Flint and Afon Pant-Gwyn.	
Natural Hazards	Hydrology	Pluvial Flooding	The Preliminary Flood Risk Assessment for Cheshire West and Chester, published November 2011, stated local sources of flooding, excluding Main River, to be surface water runoff, ordinary watercourses, groundwater and canals. There are a few areas of surface water flooding, mostly associated with ordinary watercourses or overland flow routes. Notable locations include: • Land east of Pool Lane, Stanlow Oil Refinery; • Land adjacent to Gale Brook; • Land adjacent to Thornton Brook East; • Land adjacent to the River Gowy and its tributaries; • Land adjacent to the Shropshire Union Canal, Wervin; • Chorlton Lane; • Collinge Wood; • South of Station Road, Lea by Backford; • Land adjacent to Grove Road, Lea by Backford; • Land east of Parkgate Road, Mollington; and • Land south west of Chester Road, Sandycroft.	Y

Major Event Group	Major Event Category	Major Event Type	Basis of Decision to Scope In/Out	Scope In?
			The BVS on the existing Flint to PoA pipeline are located in areas which are at very low risk of surface water flooding (areas of land with 0.1% (of less) chance of flooding each year from surface water).	
Natural Hazards	Hydrology	Groundwater Flooding	The Cheshire Strategic Flood Assessment (Cheshire West and Chester Council, 2016) indicates that few areas within the Proposed Development are susceptible of groundwater flooding. These areas are mainly located within the eastern section of the Proposed Development (Grinsome Road Above Ground Installation (AGI) and Alcohols Site AGI) and in proximity of the River Dee.	Y
Natural Hazards	Hydrology	Avalanches	Not considered relevant given the geographical location of the Proposed Development. The Proposed Development's topography is relatively flat and therefore an avalanche could not occur.	N
Natural Hazards	Climatological and Meteorological	Cyclones, hurricanes, typhoons, storms and gales	Cyclones, hurricanes and typhoons do not occur in the UK. The winter of 2015/2016 was the second wettest winter on record and a series of storms (including 'Desmond' and 'Eva') resulted in heavy and sustained rainfall. 17,600 UK properties were flooded, and several bridges collapsed, disrupting access to and from local communities. Storms and gales could result in damage to the AGIs and the BVS compounds. Their design takes into account environmental conditions including exposure to UK weather conditions. The risk is not significantly different to other similar infrastructure in the locality such as AGIs for the natural gas transmission system around North Cheshire and Wales.	N
Natural Hazards	Climatological and meteorological	Thunderstorms	This type of event could result in lightning strikes to temporary elevated structures during construction (e.g. tower cranes); however, the risk is no different to other construction projects in the locality. Specific measures are therefore not considered to be required as part of the Proposed Development.	N
Natural Hazards	Climatological and meteorological	Wave surges	The Proposed Development is located in an area at risk of coastal/tidal flooding. The floodplains of the Dee Estuary and River Gowy, as well as land east of Elton, are at risk of coastal/tidal flooding. The pipeline is below ground and therefore would not be subject to the direct hydraulic forces of a wave surge. There are no AGIs within a wave surge area. The BVS are far enough inland not to be subject to wave surges.	N

Major Event Group	Major Event Category	Major Event Type	Basis of Decision to Scope In/Out	Scope In?
Natural Hazards	Climatological and meteorological	Extreme temperatures: Heatwaves Low (sub-zero) temperatures and heavy snow	This type of event could give rise to changes in climatic conditions, with infrastructure exposed to greater heat intensity and exposure to sunlight. Heavy snow could cause workers to be trapped on the construction sites. In August 1990, the UK experienced heatwave conditions with temperatures reaching what was then a record 37.1°C in Cheltenham, England. In August 2003 a UK heatwave lasted 10 days and resulted in over 2,000 deaths. Temperatures reached what was then a record 38.5°C in Faversham, England and 33°C in Anglesey, Wales. High temperature records are now being broken with increasing frequency. The most widespread and prolonged low temperatures and heavy snow in recent years occurred from December 2009 to January 2010. Daytime temperatures were mostly sub-zero across the UK. At night, temperatures in England regularly fell to -5°C to -10°C. Snowfall across the UK lasted for some time, allowing 20cm to 30cm of snow to build up, closing schools and making it very difficult to travel. Between 1981 and 2010, there were 13 occurrences where summer mean temperatures exceeded 25.2°C on five or more consecutive days. Between 1981 and 2010, there have been 1,461 days with a maximum minimum temperature below zero degrees Celsius. Between 1981 and 2010, there were 235 days with snow lying at 0900 however, there are no records from the Met Office of the depth of snow. However, the risk is not significantly different to other similar infrastructure in the locality such as AGIs for the natural gas transmission system around North Cheshire and Wales. Specific measures are therefore not considered to be required as part of the Proposed Development.	N
Natural Hazards	Climatological and Meteorological	Droughts	Over the past 40 years or so England has experienced five long-duration droughts and two shorter periods of drought. During the 2010-12 drought, parts of eastern England recorded their lowest 18-month rainfall total in over 100 years. Prolonged periods of drought can also impact infrastructure as drying out and cracking of soils may affect structural stability and prolonged dry periods can lead to cracking of surfaces and more rapid deterioration of materials. Decreased rainfall combined with an increase in the average temperature can also increase subsidence. The Proposed Development should not be vulnerable to drought as water is not an essential service during the construction, use or maintenance phases. The design of the pipeline will be resilient to ground shrinkage, and this should remain in the design risk register until designed out.	N
Natural Hazards	Climatological and Meteorological	Severe Space Weather: Solar Flares	Solar flare events are known to interrupt radio and other electronic communications. Records from solar storms in 1921 and 1960 describe widespread radio disruption and impacts on railway signalling and switching systems. Telemetry to allow remote operation of valves and remote monitoring systems will be installed as part of the Proposed Development. However, the Proposed Development is no more vulnerable than other similar infrastructure in the locality such as AGIs for the natural gas transmission system around North Cheshire and Wales.	N
Natural Hazards	Climatological and Meteorological	Severe Space Weather: Solar Energetic Particles	Solar energetic particles which cause solar radiation storms, but only in outer space, so this major event type can be scoped out.	N

Major Event Group	Major Event Category	Major Event Type	Basis of Decision to Scope In/Out	Scope In?
Natural Hazards	Climatological and Meteorological	Severe Space Weather: Coronal Mass Ejections	Coronal mass ejections (CME) cause geomagnetic storms. The geomagnetic storm in 2003 caused the UK aviation sector to lose some GPS functions for a day, however there was no known significant impact on infrastructure.	N
Natural Hazards	Climatological and Meteorological	Fog	Fog is one of the most common weather conditions in the UK, particularly throughout autumn and winter. Severe disruption to transport occurs when the visibility falls below 50m over a wide area. It is only during the construction phase when fog may impact the Proposed Development, however in this event construction works would cease until weather conditions had improved.	N
Natural Hazards	Climatological and Meteorological	Wildfires: Forest fire, Bush/brush, pasture	The Proposed Development is not located in, or surrounded by, areas of woodland that could be at risk of wildfire events during hot, dry periods and/or fires initiated by construction related activities.	N
Natural Hazards	Climatological and Meteorological	Poor Air Quality	In 2006 the UK experienced two periods of extended hot weather with associated elevated ozone and harmful airborne particles. In the spring of 2015, two particle pollution episodes caused widespread poor air quality throughout the UK, with multiple areas measuring 'High' on the Daily Air Quality Index and resulted in around 1,100 deaths due to exacerbation of pre-existing ill-health conditions. Summer 2015 also contained two elevated ozone episodes. Construction: Construction effects would be temporary for the duration of the construction phase. These effects would relate to: • Increased dust deposition from construction activities and traffic could lead to potential loss of amenity and harm to ecological receptors; • Increased exposure to particulate matter (PM10 / PM2.5) in relation to human health; and • Increased exposure to emissions from vehicles (NO2 / PM10 / PM2.5) from construction plant and construction vehicle movements. Operation: No likely significant effects on local air quality have been identified for the operational phase. Following implementation of appropriate mitigation measures, no significant residual air quality effects are anticipated during construction and operation of the Proposed Development.	N
Natural Hazards	Biological	Disease epidemics: - Viral - Bacterial - Parasitic - Fungal - Prion	The Proposed Development is located in a developed country where the population is in general good health. Furthermore, the use of the Proposed Development is not going to give rise to any disease epidemics. Public Health England and Public Health Wales, the executive agencies of the Department of Health are responsible for protecting the nation from public health hazards, preparing for and responding to public health emergencies. One of Public Health England's and Wales' functions is to protect the public from infectious disease outbreaks and the Agencies have produced documents providing operational guidance for the management of outbreaks of communicable disease, 'Communicable Disease Outbreak management: Operational Guidance'.	N
Natural Hazards	Biological	Animal Diseases: - zoonotic: • avian influenza • West Nile virus	Low and highly pathogenic avian influenza has been recorded in poultry in the UK several times in the last 10 years, most recently in the winter of 2016/17, although with no human cases reported. There was a devastating foot and mouth outbreak in 2001. There are no known foot and mouth burial pits within the Newbuild Infrastructure Scoping Boundary.	N

Major Event Group	Major Event Category	Major Event Type	Basis of Decision to Scope In/Out	Scope In?
		• Rabies - non-zoonotic: • foot and mouth • swine fever	Animal diseases has been Scoped Out as the use of the Proposed Development is not going to be the source of any disease epidemics.	
Natural Hazards	Biological	Plants	Should invasive plant species be identified during ongoing ecological survey works, standard control measures will be implemented by the appointed contractor during construction to handle and dispose of any diseased plants and/or injurious weeds and prevent their spread.	N
Technological or Manmade Hazards	Societal	Extensive public demonstrations which could lead to violence and loss of life.	The Proposed Development is located in a developed country that has steady, yet small population growth. England and Wales are politically stable with no direct border with countries experiencing conflicts. The Proposed Development is not considered highly controversial and should not lead to high profile public demonstrations.	N
Technological or Manmade Hazards	Societal	Widespread damage to societies and economies.	The Proposed Development is located in a developed country that has steady, yet small population growth. England and Wales are politically stable with no direct border with countries experiencing conflicts.	N
Technological or Manmade Hazards	Societal	The need for large-scale multi-faceted humanitarian assistance.	The Proposed Development is located in a developed country that has steady, yet small population growth. England and Wales are politically stable with no direct border with countries experiencing conflicts.	N
Technological or Manmade Hazards	Societal	The hindrance or prevention of humanitarian assistance by political and military constraints.	The Proposed Development is located in a developed country that has steady, yet small population growth. England and Wales are politically stable with no direct border with countries experiencing conflicts.	N
Technological or Manmade Hazards	Societal	Significant security risks for humanitarian relief workers in some areas.	The Proposed Development is located in a developed country that has steady, yet small population growth. England and Wales are politically stable with no direct border with countries experiencing conflicts.	N
Technological or Manmade Hazards	Societal	Famine	The Proposed Development is located in a developed country that produces its own crops and imports food. It is politically stable and not subject to hyperinflation and therefore food is available, whether produced within the UK or imported. Famine is also not relevant to the use of the Proposed Development.	N
Technological or Manmade Hazards	Societal	Displaced population	There will be no significant displacement of populations as part of the Proposed Development.	N
Technological or Manmade Hazards	Industrial and Urban Accidents	Major Accident Hazard Chemical sites	There are at least 10 Control of Major Accident Hazard (COMAH) sites within a 5km corridor along the Proposed Development.	Y

Major Event Group	Major Event Category	Major Event Type	Basis of Decision to Scope In/Out	Scope In?
			Essar Oil Stanlow (Upper Tier), CF Fertilisers (Upper Tier), Innospec Ltd (Upper Tier), Encirc Limited (Lower Tier), Argent Energy Holdings Limited (Upper Tier), CLH Pipeline System (CLH-PS) Limited (Upper Tier), FMC Agor Limited (Upper Tier), Valspar (UK) Corp Ltd (Lower Tier), Great Bear Distribution Limited (Lower Tier).	
Technological or Manmade Hazards	Industrial and Urban Accidents	Major Accident Hazard Pipelines	There are several Major Accident Hazard (MAH) pipelines whose consultation distances overlap with the Study Area associated with the Proposed Development.	Y
Technological or Manmade Hazards	Industrial and Urban Accidents	Nuclear	Nuclear sites are designed, built and operated so that the chance of accidental releases of radiological material in the UK is extremely low. The last historical major accident in the UK was Windscale in 1957. There are no nuclear sites within a 5km corridor along the Proposed Development.	N
Technological or Manmade Hazards	Industrial and Urban Accidents	Fuel storage	In December 2005 Europe's largest peacetime fire occurred at the Buncefield Oil Storage Terminal in Hemel Hempstead, England. The surrounding area was temporarily evacuated, and some local businesses experienced long-term disruption to operations. There are fuel storage sites within the study area. Stanlow Terminals Limited (Lower Tier) within 100m. Hawarden Airport (also known as Chester Airport) is located approximately 530m south east of the proposed pipeline route north of Broughton. CLH Pipeline System (CLH-PS) Limited with fuel storage and distribution located near chainage 1-14 within 250m of the proposed pipeline route.	Y
Technological or Manmade Hazards	Industrial and Urban Accidents	Dam breaches	Dam breaches in the UK are rare; the last major breach was at the Cwm Eigiau dam in 1925, which caused 17 fatalities and widespread flooding. The Environment Agency Flood Risk from Reservoirs map indicates that the pipeline crosses one area at risk of reservoir flooding. This is at the River Dee and its floodplain on the right bank within the existing flood zone C1 / Flood Zone 2. However, as the pipeline is located below ground it is unlikely to be affected by flooding as a result of a dam breach.	N
Technological or Manmade Hazards	Industrial and Urban Accidents	Mines and storage caverns	The section of the Proposed Development that lies within Wales is located within a Coal Mining Reporting Area due to the legacy mining of the region, and potential for the Proposed Development to be underlain by historical voids. The Coal Authority Interactive Map viewer indicates there are probably shallow workings below the Proposed Development route and former mine shafts within the near vicinity (including the buffer zone). Shallow coal mining related stability issues to be assessed and addressed in line with Coal Authority Guidance which will make the risk as low as reasonably practicable (ALARP). This risk should remain in the design risk register.	N
Technological or Manmade Hazards	Industrial and Urban Accidents	Fires	Fires could be initiated by construction related activities which impact areas adjacent to the construction area. During construction, standard control measures would be implemented by the appointed contractor to manage the risk of fire. There is a working airfield with fuel storage located at Broughton, 530m south-east of the Newbuild Infrastructure Scoping Boundary. This is a sufficient distance from the Newbuild Infrastructure Scoping Boundary that a fire would not have a significant impact on any part of the Proposed Development. Urban buildings in close proximity of the Newbuild Infrastructure Scoping Boundary are low-rise and predominantly residential, although taller commercial properties exist.	Y

Major Event Group	Major Event Category	Major Event Type	Basis of Decision to Scope In/Out	Scope In?
			Notwithstanding this, the risk of fires affecting the pipeline associated with the Proposed Development during operation is no greater than risks to other existing below ground pipelines. However, consideration needs to be given to the AGI's within the consultation distances of the existing COMAH sites.	
Technological or Manmade Hazards	Transport accidents	Road	Significant transport accidents occur across the UK on a daily basis, mainly on roads, and involving private and/or commercial vehicles. The Newbuild Infrastructure Scoping Boundary includes approximately 40no. potential road crossings. Of these, three would cross the trunk road network at the M56, M53 and A494. Further 'A' Road crossings would be required at, for example, the A41, A540, A548, and A550. 'B' road network crossings include the B5129, B5125, and B5126. The remainder of road crossings would take place at classified unnumbered roads and unclassified roads. During construction there will be an increase in heavy construction plant and equipment on the local road network which would form the entry and exit points for construction traffic and therefore may increase the risk of accidents. Careful consideration of the micro-siting of these temporary access points will be a key feature in terms of reducing the risk of adverse effects, with access points needing to incorporate appropriate visibility splays, turning radii and speed limit reductions where necessary/appropriate. Outside of those design measures, the main mitigation for traffic and transport effects will be described within the Register of Commitments that will be submitted with the Environmental Statement. The operation of the Proposed Development will not result in increased traffic flow or changes to traffic composition which could have an adverse impact on highway safety. It is considered that there will not be a significant risk to underground pipeline integrity as a result of a road traffic accident as the pipeline will be buried and constructed to good engineering practice. The AGIs and block valves are located at least 100m away from trunk/'A' roads and are within a fenced compound and therefore are unlikely to be impacted during a road traffic accident.	N
Technological or Manmade Hazards	Transport accidents	Rail	The proposed pipeline route alignment would require crossing of the rail network in England and Wales. These include the London to Holyhead, Hooton to Helsby, Wrexham to Bidston and Chester to Liverpool Merseyrail Wirral Line. Trenchless crossing techniques will be employed during the construction phase so as not to impact ongoing use of the railway. There will be close liaison and agreement with the railway operator before works commence near and under the railway. The pipeline is a sealed, below-ground feature and therefore where it passes underneath embankments there is potential impacts on rail lines from subsidence over time and potentially vibration from trains passing over at high speed on the pipeline which will need to be considered in the design. It is considered that there will not be a significant risk to underground pipeline integrity from an impact resulting from a rail accident as the pipeline will be buried and constructed to good engineering practice. The AGIs and block valves are located within a fenced compound a significant distance away from the railway line and are unlikely to be impacted during a rail accident.	N
Technological or Manmade Hazards	Transport accidents	Waterways	The Newbuild Infrastructure Scoping Boundary crosses the Shropshire Union Canal which has a moderate ecological status and is mainly used by pleasure craft. Trenchless crossing techniques will be employed during the construction phase so as not to impact ongoing use of the canal. There will be close liaison and agreement with the canal operator before works commence near and under the canal.	N

Major Event Group	Major Event Category	Major Event Type	Basis of Decision to Scope In/Out	Scope In?
			The pipeline is a sealed, below-ground feature and therefore there are no potential impacts anticipated for surface water bodies from the pipeline during the operational phase.	
Technological or Manmade Hazards	Transport accidents	Aviation	There have been no major air accidents in the UK since the Kegworth incident in 1989. There is one working airfield within the study area. Hawarden Airport (also known as Chester Airport) is located approximately 530m south east of the Proposed Development, north of Broughton. During operation, the risks associated with the Proposed Development should be no greater than the current situation. As the pipeline is buried below ground in this area, it is protected from above ground aviation incidents and is unlikely to be the initiator of an aviation incident. There are no AGIs or BVS in proximity to the airport.	N
Technological or Manmade Hazards	Pollution accidents	Air	Construction: Construction activities may cause an increase in the exposure to dust, particulate matter and emissions from vehicles and construction plant. However, this will only be on a short-term basis and those emissions associated with construction plant and vehicles are managed under specific environmental, health and safety legislation. The potential for this event will be considered in detail as part of the Environmental Impact Assessment process, and it is therefore not considered a requirement to evaluate this further. Operation: If there was a significant loss of containment event involving an AGI and/or pipeline and/or BVS it would result in a large-scale release of CO2 to the environment which could potentially cause a significant adverse impact on local air quality. As CO2 is not currently defined as a dangerous substance under the Control of Major Accident Hazards Regulations 1999 (COMAH) or as a dangerous fluid under the Pipelines Safety Regulations 1996, there is no requirement to produce a formal Safety Case Report. In addition, detailed standards and codes of practice written specifically for the design and operation of dense phase or supercritical CO2 plant and pipelines are currently being developed. Therefore, further consideration of this event will be undertaken as part of the Environmental Impact Assessment.	Y
Technological or Manmade Hazards	Pollution accidents	Land	During the construction phase there may be an increase in the risk of leaks and spillages of hazardous materials associated with the construction activities. However, standard control measures would be implemented by the appointed contractor to manage the risk of spillages and leaks.	N
Technological or Manmade Hazards	Pollution accidents	Water	The superficial underlying aquifers comprise Secondary A aquifers and Secondary Undifferentiated aquifers. The bedrock aquifers comprise Principal, Secondary A, Secondary B and Secondary Undifferentiated aquifers. Given the rural nature of parts of the Proposed Development area both the Principal and Secondary Aquifers support a significant number of private water supplies. It is important that these water resources are protected. A groundwater Source Protection Zone (SPZ) Total Catchment Zone 3 is located at approximately 750m from the pipeline route (chainage 1-30), east of Chester and south of the River Dee. Within the eastern section of the Newbuild Infrastructure Scoping Boundary (England), there are several groundwater abstractions located within 1km, all of which are used for industrial and agricultural uses. No information is currently available on the presence of groundwater abstractions within the western section of the Newbuild Infrastructure Scoping Boundary (Wales).	N

Major Event Group	Major Event Category	Major Event Type	Basis of Decision to Scope In/Out	Scope In?
			A groundwater SPZ is located in the centre of the existing Flint to Point of Ayr pipeline route, related to an unknown water abstraction. The most eastern block valve (Cornist Lane) is approximately 1 km south west of the SPZ. During construction there may be an increased risk of leaks and spillages of hazardous materials associated with the construction activities. However, standard control measures would be implemented by the appointed contractor to manage the risk of spillages and leaks.	
Technological or Manmade Hazards	Utilities failures	Electricity	Instances of electricity failure (also referred to as power loss or blackout) can be caused by a number of things, such as severe weather (e.g. very strong winds, lightning and flooding) which damage the distribution network. These tend of be mainly specific place, local (e.g. metropolitan area) and less frequently regional (e.g. North East) as a result of severe winter storms and consequent damage to the distribution overhead line network. Detailed information on the utilities which are located in the Proposed Development order limits will not be available until the final route of the Proposed Development is defined.	Y
Technological or Manmade Hazards	Utilities failures	Gas	Detailed information on the utilities which are located in the Proposed Development order limits will not be available until the final route of the Proposed Development is defined.	Y
Technological or Manmade Hazards	Utilities failures	Water supply	No water use associated with the Proposed Development during its operation and relatively low use during construction which could be addressed by tankering in supplies if required.	N
Technological or Manmade Hazards	Utilities failures	Sewage system	No use of the sewage system associated with the Proposed Development. During the construction phase temporary portable systems will be in place covered by H&S welfare requirements.	N
Technological or Manmade Hazards	Malicious Attacks	Unexploded Ordnance	There is the potential for encountering unexploded ordnance during construction of the Proposed Development as the Deeside area was bombed during World War Two. Measures would be undertaken during construction to brief operatives to raise awareness of this issue, and to define appropriate response strategies such this be discovered during the works. There would be a limited risk of unexploded ordnance affecting the Proposed Development, once operational but no greater than similar developments.	Y
Technological or Manmade Hazards	Malicious Attacks	Attacks Chemical Biological Radiological Nuclear	Extremists remain interested in Chemical, Biological, Radiological and Nuclear (CBRN) materials, however alternative methods of attack such as employing firearms or conventional explosive devices remain far more likely. Historical use has been in closed densely occupied structures (underground, buildings) or targeted at specific individuals. The Proposed Development is unlikely to be a target for this type of event due to the low number of exposed targets.	N
Technological or Manmade Hazards	Malicious Attacks	Transport systems	Potential systems would include (but are not limited to) railways, buses, passenger ferries, cargo vessels and aircraft. The Proposed Development is unlikely to be a target for this type of event due to the low number of exposed targets.	N

Major Event Group	Major Event Category	Major Event Type	Basis of Decision to Scope In/Out	Scope In?
Technological or Manmade Hazards	Malicious Attacks	Crowded places	The Proposed Development does not fall within the definition of a crowed place, i.e. pedestrian routes and other thoroughfares as well as sports arenas, retail outlets and entertainment spaces. The Proposed Development is unlikely to be a target for this type of event due to the low number of exposed targets.	N
Technological or Manmade Hazards	Malicious Attacks	Cyber	Cyber attacks occur almost constantly on key national and commercial electronic information, control systems and digital industries. The reliance on telemetry for remote monitoring and to allow the remote operation of valves could render the Proposed Development more vulnerable to a cyber-attack. Notwithstanding this, it is not considered to be more vulnerable to attack than similar infrastructure installed and running elsewhere in the UK.	N
Technological or Manmade Hazards	Malicious Attacks	Infrastructure	Terrorists in the UK have previously attacked, or planned to attack, national infrastructure. Attempts were made to attack electricity substations in the 1990s. Bishopsgate, in the City of London, was attacked in 1993 and South Quay in London's Docklands in 1996. These attacks resulted in significant damage and disruption but relatively few casualties. An attack on the Proposed Development would have minimal impact on local/regional/national infrastructure or be considered a high-profile attack.	N
Technological or Manmade Hazards	Engineering accidents and failures	Bridge failure	Bridge works are not proposed as part of the Proposed Development.	N
Technological or Manmade Hazards	Engineering accidents and failures	Flood defence failure	Land adjacent to the Dee Estuary within the Newbuild Infrastructure Scoping Boundary is classed as an area benefitting from flood defences for flooding from the sea. These defences run along the edge of the Dee Estuary, Finchetts Drain, Border Drain and Sandycroft drain (upstream of Chester Road). There is also an area of Hawarden Airport which benefits from fluvial flood defences, likely associated with the Sandycroft Drain. There are also flood defences along the Mill Brook, River Gowy and its tributaries, and Elton Green Brook. These defences comprise of either high ground or embankments along the watercourses. As a result, the Essar Stanlow Refinery site is defined as an area benefitting from these defences. The design of the Proposed Development will be developed to include allowances for future climate change predictions that could result in flooding. It is considered that the Alcohols Site and Grinsome Road AGIs which benefit from the flood defences are at no greater risk than other similar existing major hazard installations infrastructure protected by the flood defences and therefore the risks are considered to be as low as reasonably practicable (ALARP).	N
Technological or Manmade Hazards	Engineering accidents and failures	Mast and tower collapse	There are no towers or masts in close proximity to the Proposed Development or being built as part of the Proposed Development.	N
Technological or Manmade Hazards	Engineering accidents and failures	Property or bridge demolition accidents	The Proposed Development does not involve demolition works.	N
Technological or Manmade Hazards	Engineering accidents and failures	Tunnel failure/fire	There are no tunnel structures proposed as part of the Proposed Development or within the study area.	N

11.6. PROPOSED ASSESSMENT METHODOLOGY

11.6.1. For those MA&D event types which have been scoped in for detailed assessment in the ES, the proposed assessment process which will be used in the ES will include:

- Identifying potential risk events related to the scoped in MA&D event types;
- Screening these risk events, e.g. to remove unrealistic worst-case scenarios;
- Defining the likely worst-case consequences (impact);
- Assessing the likelihood; and then
- Determining whether the risk event could result in a MA&D event and if relevant, whether the risk is ALARP with the proposed mitigation measures.

11.7. LIMITATIONS AND ASSUMPTIONS

11.7.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- The design of structures and infrastructure will be subject to relevant Hazard Identification (HAZID) studies and actions identified integrated into the final design to reduce risks to ALARP.
- The construction stage(s) of the Proposed Development will be managed through the implementation of the Construction Phase Plan (required under the CDM Regulations 2015) and CEMP.
- The Proposed Development is being designed and its implementation guided by other industry standards and codes, many of which are mandatory. These require infrastructure and systems to be designed so that risks to people and the environment are either eliminated or reduced to levels that are ALARP.
- It is considered highly unlikely that the Proposed Development would be demolished after its design life as it is likely to have become an integral part of the infrastructure in the area, therefore the demolition of the Proposed Development is scoped out.

11.7.2. Environmental effects associated with unplanned events that do not meet the definition of a major accident and/or disaster (e.g. minor leaks and spills that may be contained within the construction sites are addressed in other topic chapters as appropriate and not in this section). It is also recognised that the management framework for the Proposed Development is not fully defined at this stage; however, a presumption of standard practice and regulatory compliance within the adopted management framework has been assumed and will be developed following the appointment of the Principal Contractor.

11.8. REFERENCES

- **Ref. 11-1** The Seveso III Directive (Directive 2012/18/EU).
- **Ref. 11-2** International Federation of Red Cross and Red Crescent Societies, What is a Disaster? (http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/what-is-a-disaster/) (Accessed 24 March 2021)
- **Ref. 11-3** Guidelines for Environmental Risk Assessment and Management: Green Leaves III, Cranfield University and Department for Environment, Food and Rural Affairs, November 2011.
- **Ref. 11-4** Control of Major Accident Hazards Regulations 2015 (SI 2015 No. 483) (COMAH).
- **Ref. 11-5** Major Accident Off-Site Emergency Plan (Management of Waste from Extractive Industries) (England and Wales) Regulations 2009.
- **Ref. 11-6** Health and Safety Executive (2015) The Control of Major Accident Hazards Regulations 2015: Guidance on Regulations, L111, Third Edition, June 2015.
- **Ref. 11-7** The Pipelines Safety Regulations 1996 (SI 1996 No. 825).
- **Ref. 11-8** COMAH Competent Authority, "All Measures Necessary" – Environmental Aspects, Version 7, April 2016.
- **Ref. 11-9** Civil Contingencies Act 2004 (c36).
- **Ref. 11-10** HM Government (2020) National Risk Register. Available at: https://www.gov.uk/government/publications/national-risk-register-2020 (Accessed 24 March 2021)
- **Ref. 11-11** British Geological Survey (2020) Geo Index Onshore. Available at: http://mapapps2.bgs.ac.uk/geoindex/home.html (Accessed 24 March 2021)
- **Ref. 11-12** Prevention Web Europe (2005) Tsunamis Hazard Map. Available at https://www.preventionweb.net/english/professional/maps/v.php?id=3831 (Accessed 11 March 2021)
- **Ref. 11-13** The International Disaster Database (2009). Available at: http://www.emdat.be/ (Accessed 11 March 2021)
- **Ref. 11-14** Health and Safety Executive (2021) Planning Advice Web App. Available at: https://pa.hsl.gov.uk/ (Accessed 25 March 2021)
- **Ref. 11-15** Health and Safety Executive (2021) COMAH 2015 Public Information Search. Available at: https://notifications.hse.gov.uk/COMAH2015/Search.aspx (Accessed 16th and 24th March 2021)

- **Ref. 11-16** Google (2021) Aerial and street view maps covering Study Area. Available at: https://www.google.com/maps/ (Accessed 15 and 30th March 2021)
- **Ref. 11-17** HM Government (2017) Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, 2017
- **Ref. 11-18** Health and Safety at Work etc. Act 1974 (c. 37).
- **Ref. 11-19** Construction (Design and Management) Regulations 2015 (SI 2015 No. 15).
- **Ref. 11-20** CDOIF guideline “Environmental Risk Tolerability for COMAH Establishments” v2, accessed 3/3/18 from http://www.sepa.org.uk/media/219154/cdoif_guideline__environmental_risk_assessment_v2.pdf.
- **Ref. 11-21** The International Standards Organization’s ISO 31000: 2009 Risk Management – principles and guidelines.

12. MATERIALS AND WASTE

12.1. INTRODUCTION

12.1.1. This Chapter considers the impact of the Proposed Development on the consumption of material assets, and generation and disposal of waste. It considers impacts during construction and operation, and any potential significant adverse environmental effects.

12.1.2. This chapter sets out the proposed methodology for the material assets and waste assessment and identifies those impacts that should be scoped in, and those that can be scoped out, of the EIA.

12.2. STUDY AREA

12.2.1. The study areas that are applicable to the Proposed Development (as defined in IEMA's 2020 Guide to Materials and Waste in Environmental Impact Assessment (**Ref. 12-1**), (herein referred to as the 'IEMA Guide') are:

- The **development study area** - the extent of works within the Newbuild Infrastructure Scoping Boundary, including areas required for temporary access, site compounds, working platforms and other enabling activities.
- The **expansive study area** extends to the availability of construction materials and the capacity of waste management facilities within the UK and the regions where the Proposed Development is located; the North West of England region (Cheshire, Cumbria, Greater Manchester, Lancashire, Merseyside, Warrington and Halton) and North Wales (Conwy, Denbighshire, Flintshire, Gwynedd, Isle of Anglesey, Powys and Wrexham)[9].

12.3. BASELINE CONDITIONS

12.3.1. This chapter describes baseline material consumption and waste disposal for the current land use and provides regional and national information and data in the context of which environmental assessment can be undertaken.

12.3.2. The most up to date sources of information have been used to collate data for material resource availability, landfill capacity and waste recovery. Indication of the most recent year from which data has been acquired is provided throughout. The baseline data collected and presented in this section were obtained by desk study, from publicly available data sources.

[9] Where no data for North Wales are available, data for Wales has been used.

MATERIALS

Materials Currently Required

12.3.3. The Newbuild Infrastructure Scoping Boundary predominantly includes agricultural land, with some industrial and residential areas. Other assets and environmental attributes include highways, rail infrastructure, a canal, and rivers.

12.3.4. The types of material that are expected to be required for the existing land uses identified comprise (mainly) aggregate, concrete, steel and asphalt – their use would be associated with routine maintenance and repair works, and typically for transportation assets.

12.3.5. Although no data is currently available, professional judgement can be used to assert that by comparison with regional and national availability of resources, consumption of construction and other materials for routine activities currently required within the current land uses, is minimal.

Materials Availability

12.3.6. **Table 12-1** provides a summary of the availability of the main construction materials in North West of England region, Wales (in lieu of North Wales specific data) and the UK. The materials listed are considered to be appropriate to the bulk construction materials required for the Proposed Development. The overview excludes technological products but provides a proportionate context in which the assessment of impacts and significant effects from material consumption can be undertaken.

Table 12-1: Construction Materials Availability in the North West of England, Wales and the UK

Material Type	North West England	Wales	UK
Sand and gravel * (**Ref. 12-2)**	2.8 million tonnes (Mt)	1.6 Mt	(refer to primary aggregate)
Permitted crushed rock * **(Ref. 12-2)**	5.7 Mt	12.0 Mt	
Primary aggregate (comprises sand and gravel and crushed rock) * (**Ref. 12-2**)	(no data)	13.6 Mt	198.8 Mt

Material Type	North West England	Wales	UK
Concrete blocks # **(Ref. 12-3)**	3.5 million square meters (Mm^2) (North)	1.1 Mm^2) (Scotland and Wales)	9.1 Mm^2 (GB)
Recycled and secondary aggregate + and *	5.3 Mt (2017)	(no data)	71.0 Mt (GB) (Mineral Products Asociation, 2020)
Ready-mix concrete * **(Ref. 12-2)**	1.6 million cubic meters (Mm^3)	0.6 (Mm^3)	24.7 Mm^3
Steel + **(Ref. 12-4)**	(no data)	3.9 Mt (2018)	7.2 Mt (2018)
Asphalt * **(Ref. 12-2)**	2.4 Mt	1.4 Mt	27.4 Mt
# stocks + production * sales Data availability: 2019 unless otherwise stated Data for Wales has been used, as data for North Wales were not available at the time of publication GB: Great Britain (England, Wales and Scotland) figures used where UK figures (including Northern Ireland) are unavailable			

12.3.7. Across the North West of England, Wales and the UK, the availability of construction materials typically required for construction schemes, indicates that stocks / production / sales remain buoyant.

12.3.8. Where data are available, the North West of England region has, in general, a higher than average availability of some construction materials by comparison with other UK regions. For example, stocks of concrete block and sales of recycled and secondary aggregate are amongst the highest in the UK. Within Wales, the sales of permitted crushed rock are above the average for all UK regions. Sales and sand and gravel within the North West of England and Wales are below the UK average, as are concrete block stocks and ready-mix concrete sales within Wales.

Local Policy Context

12.3.9. Policy ENV9 of the Cheshire West and Chester Council Local Plan (**Ref. 12-5**) sets out mineral supply and safeguarding provisions. Sand and gravel reserves within the Local Authorities region contribute to national land-won resources.

12.3.10. The Flintshire Unitary Development Plan (**Ref. 12-6**) details the protection of mineral interests under Policy MIN8. The Aggregates Safeguarding Map of Wales (North East Wales) (**Ref. 12-7**) shows Category 1 (nationally important) and Category 2 (of regional and local importance) sand and gravel deposits within the county of Flintshire.

12.3.11. The Newbuild Infrastructure Scoping Boundary includes and is close to a number of sand and gravel reserves. The Aggregate (**Ref. 12-7**) and Mineral Safeguard Areas (**Ref. 12-8**) are located at the Block Valve Station (BVS) locations (reference Pentre Halkyn, Babell, Cornist Land and Coed-y-Cra), which also incorporate limestone reserves at Pentre Halkyn and Babel; near Connah's Quay (at the A494 and Holywell Road); near the A55 at Northop and Star Land; and to the east of Flint Mountain near Allt-Foch Lane); Lea by Backford and Backford; south of Croughton near the M53 Motorway; and near Thornton Green Lane where it crosses the M56 motorway.

12.3.12. Some sterilisation of these mineral resources may occur where current infrastructure (road, rail, buildings) are not present. This will be assessed further in the Environmental Statement (ES) as the Proposed Development is confirmed.

12.3.13. There are no known peat resources or active peat extractions within the development route corridor (**Ref. 12-9, 12-10** and **12-11**).

Site Arisings Currently Generated

12.3.14. The current land use within the Newbuild Infrastructure Scoping Boundary is expected to generate minimal volumes of site arisings, limited to potential earthwork arisings from agricultural activities and surplus materials generated during minor repair works on existing road, rail and canal infrastructure (such as aggregate, steel and stone). Although no data exist, it is anticipated (using professional judgement) that the current generation of site arisings is minimal.

Regional Perspective: Transfer, Recovery and Recycling

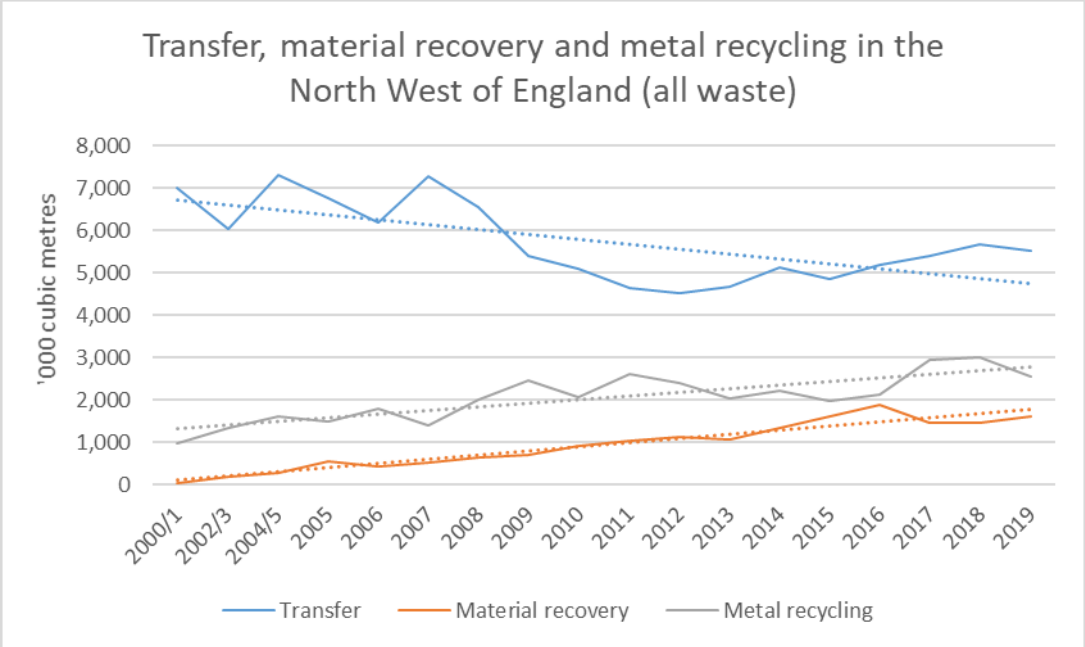
12.3.15. Defra data (**Ref. 12-12**) (**Table 12-2**) show that within England, the recovery rate for non-hazardous construction and demolition wastes have remained above 90% since 2010. Data for Wales is only available for the year 2012 and the recovery rate was 87% (**Ref. 12-13**). This exceeds the EU target of 70% (by weight) by 2020, which the UK is currently meeting. This target excludes naturally occurring materials (specifically category 17 05 04 in the list of waste defined as non-hazardous soils and stones) (**Ref. 12-14**).

Table 12-2: Non-hazardous Construction and Demolition Waste Recovery in England (all years) and Wales (2012 only)

Year	Generation (Mt)	Recovery (Mt)	Recovery rate (%)
2010	53.6	49.4	92.2%
2011	54.9	50.8	92.5%
2012	50.5	46.4	92.0%
2012 (Wales)	3.4	3.0	87.0%
2013	51.7	47.6	92.0%
2014	55.9	51.7	92.4%
2015	57.7	53.3	92.3%
2016	59.6	55.0	92.1%
Note: Defra's 2019 update of this table does not extend the data range beyond 2016			

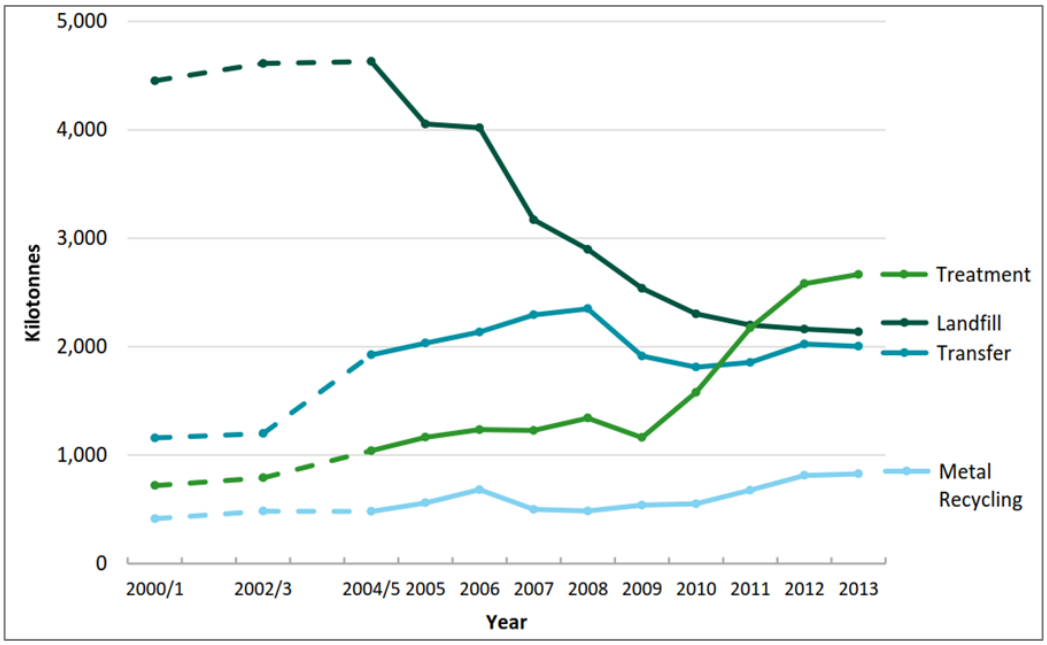
12.3.16. Data in **Figure 12-1** has been collated to show that trends for waste recovery (material recovery and metal recycling) in the North West of England region (no data for Wales exists) have risen steadily over the past 19 years **Ref. 12-15**. Data are provided for all waste types in the North West of England and hence will include, but are not specific to, Construction, Demolition and Excavation (CDE) wastes.

Figure 12-1: Transfer, Material Recovery and Recycling in the North West Region (2000/1 - 2019)



12.3.17. Long term regional data for CDE wastage and recovery trends are not available for Wales. Instead, data in **Figure 12-2** show that rates of waste recovery (treatment, transfer and metal recycling) for all types of waste (including CDE) have increased or remained constant since 2004 until the latest available data in 2013 (**Ref. 12-16**).

Figure 12-2: Waste Recovery Rates in Wales (2000/1 – 2013)



12.3.18. The trends for transfer, treatment, recovery and metal recycling in the North West of England and Wales indicate that there is likely to be regional

infrastructure and capacity for managing CDE wastes from the Proposed Development. This assertion is further affirmed by the number of permitted waste recovery sites presented in **Table 12-3 (Ref. 12-15)**. Corresponding data for Wales is only available from 2013 (**Ref. 12-13**).

Table 12-3: Permitted Waste Recovery Sites in the North West of England Region (2019) and Wales (2013)

Waste recovery facility type	Number of sites (North West England) (2019)	Number of sites (Wales) (2013)
Incineration	17	4 (3 with energy recovery)
Transfer	380	218
Treatment	426	109
Metal recovery	332	98
Use of waste	1	7
Total	**1,156**	**436**

12.3.19. Data in **Table 12-4** from the Waste Data Interrogator (**Ref. 12-17**) and Waste Permit Returns Data Interrogator (**Ref. 12-18**) show that 79% of waste received in the North West of England region and 85% of the waste received in North Wales was diverted from landfill through waste management and recovery methods. Data include the total waste received from both within the subject region and from other regions in the UK.

Table 12-4: Waste Management Routes for Waste Received in the North West of England and North Wales regions (2019)

Waste Management Route		Inert and non-hazardous waste (tonnes)	Hazardous wastes (tonnes)	Total waste (tonnes)	Percentage
Recovery	England	6,485,555	**12,525**	**6,498,081**	**79%**
	Wales	804,315	**725**	**805,040**	**85%**
Landfill	England	1,478,428	**46,534**	**1,524,963**	**18%**
	Wales	145,533	**0**	**145,553**	**15%**
Other fate	England	230,264	**0**	**230,264**	**3%**
Totals	England	8,194,248	**59,060**	**8,253,308**	**100%**

Waste Management Route		Inert and non-hazardous waste (tonnes)	Hazardous wastes (tonnes)	Total waste (tonnes)	Percentage
	Wales	949,849	**725**	**950,573**	**100%**
Recovery comprises treatment, reprocessing, transfer, use of waste in or on land (e.g. composing), incineration and long-term storage. 'Other fate' is not defined by the EA. Data for England identifies the 'fate' of the waste (such as recovery, treatment, transfer etc), however this data is not provided for Wales. Instead, the category of the waste site has been used to allow a comparison of similar data.					

12.3.20. The data presented in this section confirm the availability of waste management facilities in the regions to enable suitable recovery of site arisings generated by the Proposed Development.

Local Policy Context

12.3.21. Policy ENV9 of the Cheshire West and Chester Council Local Plan (**Ref. 12-5**) sets out waste management needs within the borough. This includes:

- Managing waste as a resource;
- Delivering sustainable waste management; and
- Promoting waste minimisation and increasing awareness

12.3.22. It is noted that sufficient waste recovery facilities are available within the borough until 2030.

12.3.23. Policy EWP7 of the Flintshire Unitary Development Plan (**Ref. 12-6**) sets out the principles of managing waste sustainably making reference to the application of the Waste Hierarchy.

12.3.24. The availability of materials recovery infrastructure regionally and across England and Wales, suggests that there is strong potential to divert from landfill site arisings generated by the Proposed Development. The importance of this infrastructure will maximise the reuse / recycling value of site arisings. Recovering arisings and diverting them from landfill has the potential to materially influence the findings of the assessment of impacts and effects from materials and waste.

WASTE GENERATION AND DISPOSAL

Waste Currently Generated and Disposed of

12.3.25. The current land use within the Newbuild Infrastructure Scoping Boundary is expected to generate minimal quantities of waste from agricultural activities and routine maintenance on the existing highway, rail and canal infrastructure.

Wastes may comprise (for example) asphalt from minor repairs to roads, steel and aggregate from repairs to rail infrastructure, litter, light and signage replacement and vegetation from verge clearance. The magnitude of impact associated with disposing of this waste is expected – using professional judgement – to be negligible in the context of available regional capacity.

Regional Perspective: Remaining Landfill Capacity

12.3.26. The latest available remaining landfill data (**Ref. 12-19** and **12-20**) confirm that in 2018/2019, 42 landfill sites in the North West of England and North Wales were recorded as having 40 million cubic meters (Mm^3) of remaining capacity. Data in **Table 12-5** summarise this information by landfill type; the change in capacity from 2018 to 2019 (for the North West of England) is also shown.

Table 12-5: Remaining Landfill Capacity in the North West of England and North Wales

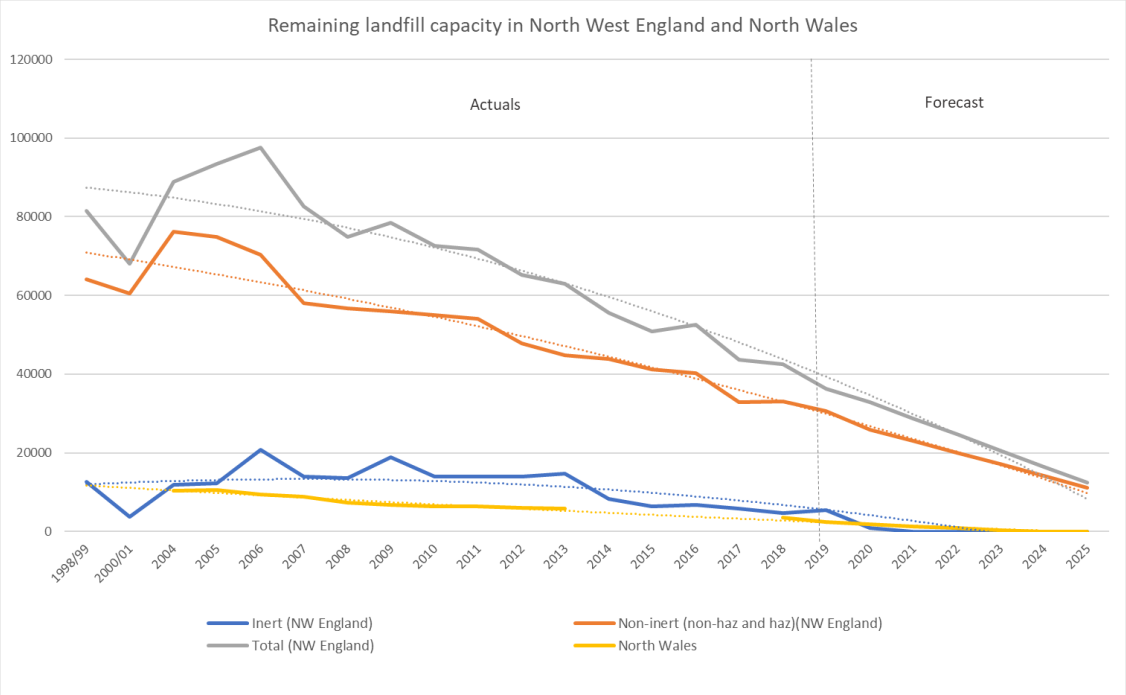
Landfill Type		Remaining capacity in 2018 (m^3)	Remaining capacity in 2019 (m^3)	2018 to 2019 remaining capacity comparison
Hazardous (merchant and restricted)	North West England	6,466,642	6,150,084	-0.3 (-4.9%)
	North Wales	0	(no data)	
Inert	North West England	4,690,296	5,498,334	+0.8 (+17.2%)
	North Wales	1,014,676	(no data)	
Non-hazardous (including stable hazardous waste cells)	North West England	31,295,890	24,655,629	-6.6 (-21.2%)
	North Wales	2,434,154	(no data)	
Total	North West England	42,446,828	36,304,047	-6.1 (-14.5%)
	North Wales	3,448,830	(no data)	

Local Policy Context

12.3.27. Policy ENV9 of the Cheshire West and Chester Council Local Plan (**Ref. 12-5**) notes that additional non-hazardous landfill capacity will be needed in 2024. Sufficient capacity of hazardous and inert landfill sites until 2030 are recorded in the Local Plan. Comparable information is not provided in the Flintshire County Council Unitary Development Plan.

12.3.28. Baseline regional capacity is detailed in **Figure 12-3**. Simple statistical forecasting (using the Microsoft Excel forecasting function) has been used to demonstrate long term void capacity to the year of planned scheme completion (currently anticipated to be 2025) in the absence of future provision. Historic data for Wales does not differentiate between waste types (inert, non-inert). As such, only total values have been used. Furthermore, data between 2013 and 2018 for Wales are not publicly available.

Figure 12-3: Remaining Landfill Capacity in North West England and North Wales



12.3.29. Baseline data indicates that in the absence of future provision, inert, non-inert and total landfill capacity will become an increasingly sensitive receptor throughout the duration of the construction phase and in operation. **Figure 12-3** and **Table 12-6** shows that in the absence of future provision, waste capacity in the North West region is forecast to reduce from 2019 to 2025 by as much as 100%.

Table 12-6: Forecast Waste Capacity

Waste type	Forecast reduction of capacity (2025)	Forecast remaining capacity (2025)
Inert waste (North West England)	100%	0
Non-inert waste (North West England)	64%	11 Mm^3
Total waste (North West England)	66%	12 Mm^3
Total waste (North Wales)	100%	0

FUTURE BASELINE

12.3.30. In the future baseline and in the absence of the Proposed Development, it is considered that the current land use within the Newbuild Infrastructure Scoping Boundary (which is predominantly agricultural) area would remain the same. It is noteworthy that as the road, rail and canal infrastructure ages, increased maintenance and repair work may be required.

12.3.31. However, given the scale of the current infrastructure within the Newbuild Infrastructure Scoping Boundary, the consumption of materials resources and the recovery of site arisings is expected to remain minimal. Similarly, the potential for waste generation to landfill in the future baseline is anticipated to remain minimal.

12.4. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

12.4.1. No specific primary mitigation for the construction and operation of the Proposed Development (material resource use and waste generation) have yet been committed to, but measures will be identified and adopted as the design develops. Principles of circular practice and sustainable resource management (including designing out waste) – in the context of the Waste Hierarchy and the Proximity Principle – will be applied and adopted through the Register of Commitments and Construction Environmental Management Plan (CEMP) which will incorporate the requirement for the Principal Contractor to prepare and implement a Site Waste Management Plan.

12.4.2. Examples of design (secondary) mitigation and enhancement measures are noted in **Table 12-7**, although none of these are yet formally committed to by the Applicant.

Table 12-7: Potential Design, Mitigation and Enhancement Measures

Element	Description	Stage
Materials	Identification and specification of material resources that can be acquired responsibly, in accordance with BES 6001 Responsible Sourcing of Construction Products (**Ref. 12-21**)	Design and construction
	Design for resource optimisation: simplifying layout and form, using standard sizes, balancing cut and fill, maximising the use of renewable materials, and materials with recycled or secondary content, and setting net importation as a scheme goal.	Design
	Design for off-site construction: Maximising the use of pre-fabricated structures and components, encouraging a process of assembly rather than construction.	Design
	Design for the future: Considering how materials can be designed to be more easily adapted over an asset lifetime, and how deconstructability and demountability of elements can be maximised at end-of-first-life.	Design
	Identify opportunities to minimise the export and import of material resources.	Design and construction
	Manage engineering plan configurations and layouts to ensure the most effective use of materials and arisings can be achieved.	Design and construction
	Implement a Materials Management Plan in accordance with the CL:AIRE Definition of Waste: Code of Practice (**Ref. 12-22**).	Construction
Waste	Engage early with contractors to identify possible enhancement and mitigation measures (for example, waste exemption licenses), and to identify opportunities to reduce waste through collaboration and regional synergies.	Design and Procurement
	Design for recovery and reuse: identifying, securing and using material resources at their highest value, whether they already exist on site, or are sourced from other schemes.	Design
	Ensure arisings are properly characterised before or during design, to maximise the potential for highest value reuse.	Design
	Forecast and identify the volume and type of woodland and other vegetative arisings that will be generated and establish opportunities for high-value reuse and recycling, both on and off-site.	Design and construction
	Working to a proximity principle, ensuring arisings generated are handled, stored, managed and reused or recycled as close as possible to the point of origin.	Design and construction
	Identify areas for stockpiling and storing wastes that will minimise quality degradation and leachate and will minimise damage and loss.	Design and construction
	As part of a Construction Environmental Management Plan (CEMP), specify management requirements for waste and arisings and capture information and data on site arisings recovered and diverted from landfill, by developing a Site Waste Management Plan once a preferred option has been selected.	Design

12.5. DESCRIPTION OF LIKELY SIGNIFICANT EFFECTS

12.5.1. The following construction and operational phase effects are potentially significant:

- The consumption of large quantities of materials could have a potentially significant adverse effect on the environment through the depletion of natural resources; and
- Waste generated by the Proposed Development: the potential for significant effects from waste disposal is commensurate with a reduction in regional landfill void capacity; landfill capacity is considered a sensitive receptor in the UK.

Table 12-8: Elements Scoped In or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Materials and waste impacts arising from Existing Pipeline Works (excluding BVS)	Construction Operation		✔	No physical works consented within this Application. Therefore, no impact pathways relevant to materials and waste.
Impacts and effects associated with the extraction of raw resources and the manufacture of products	Construction and operation		✔	The impacts and effects of extraction and manufacture of materials cannot be assured with any accuracy, and hence are scoped out of the assessment.
Consumption of material resources associated with the construction of the Proposed Development	Construction (including any site preparation, remediation and groundworks)	✔		Further information is required to assess the potential impacts of the Proposed Development construction on regional material resource availability, in the context of the recovery and reuse of site won materials and recycled/ secondary resources.
Consumption of material resources associated with the Proposed Development during operation	Operation		✔	Operational activities of the Proposed Development are not anticipated to require consumption of material resources beyond those necessary for routine repair and maintenance. As such, the impacts associated with material resource consumption are considered to be minimal and not significant.
Disposal and recovery of waste associated with the construction and demolition of the Proposed Development	Construction (including any site preparation, demolition, remediation and groundworks)	✔		Further information is required to assess the potential impacts of the Proposed Development on existing waste infrastructure and landfill capacity. Assessment will reconfirm remaining landfill capacity and identify on-site storage, potential disposal / treatment / reuse of waste and required mitigation measures. No significant demolition activities (for example existing buildings or road infrastructure) are anticipated as part of the construction phase.
Disposal and recovery of waste associated with the Proposed Development during operation	Operation		✔	The operation of the Proposed Development is anticipated to generate only minimal waste arisings from minor routine maintenance and repairs. As such, the impacts associated with waste generation and disposal in operation are considered to be minimal and not significant.
Lifecycle assessment (including embodied carbon and water) of materials and site arisings, and waste	Construction and Operation		✔	The effort and resources required to undertake a full lifecycle assessment of these elements are deemed disproportionate to the benefit they would offer the assessment of effect significance.
Impacts and effects resulting from the transportation of material resources and waste to and from the site	Construction and Operation		✔	The impacts associated with transportation will be considered as part of the air quality, climate, traffic and transport, and noise and vibration assessments – as appropriate to these specialist topics.
Impacts and effects on human health and controlled waters as a result of any	Construction and Operation		✔	Impacts and effects on human health and controlled waters will be considered in the geology and soils assessment, as appropriate to this specialist topic.

Element	Phase	Scoped In	Scoped Out	Justification
contaminated site arisings from the Proposed Development				

12.6. OPPORTUNITIES FOR ENHANCING THE ENVIRONMENT

12.6.1. At the current development stage, no environmental enhancement opportunities have been identified. Examples of potential opportunities which could be developed and incorporated into the Proposed Development include:

- Opportunities for using (or taking) surplus earthworks on (or from) other schemes being developed in similar timeframes to the Proposed Development; and
- Designing and constructing elements or assets to be deployed within the Proposed Development, in line with circular economy principles.

12.7. PROPOSED ASSESSMENT METHODOLOGY

12.7.1. Waste management is covered by Section 5.14 of the National Policy Statement for Energy. The National Policy Statement refers to the application of the water hierarchy and production, preparation of a Site Waste Management Plan (SWMP) and environmental permitting requirements (as necessary for certain developments) which may extend to operational waste management.

12.7.2. The assessment of Materials and Waste for the Proposed Development is in accordance with National Policy Statement for Energy as the magnitude of impact for waste generated by the Proposed Development is directly linked to the reduction of landfill capacity. Through the implementation of a Register of Commitments and Construction Environmental Management Plan (CEMP), a requirement for the Principal Contractor to prepare and implement a SWMP, will be set out.

12.7.3. The IEMA Guide (**Ref. 12-1**) will be used to assess the potential impacts and effects from the Proposed Development, using the process and significance criteria it sets out. It is anticipated that Method W1 (Void Capacity, as detailed in the IEMA Guide) will be used to best reflect the scale and nature of the Proposed Development.

12.7.4. In accordance with the IEMA Guide, the assessment will be a quantitative exercise that aims to identify the following:

- The type and volume of materials to be consumed by the Proposed Development, including details of any recycled materials content.
- The type and volume of waste to be generated by the Proposed Development, with details of planned recovery and / or disposal method (for example on-site reuse, off-site recycling, disposal to landfill).
- The cut and fill balance.
- Details of any materials to be specified, where sustainability credentials (particularly those that improve resource efficiency) afford performance beyond expected industry standards.

12.7.5. As described previously in this chapter, the sensitive receptors that would be incorporated into the assessment are:

- **Material resources** – consumption impacts on their immediate and long-term availability, resulting in depletion of natural resources.
- **Landfill void capacity** – reductions in regional and national infrastructure, resulting in unsustainable use or loss of resources and temporary or permanent degradation of the natural environment.

12.7.6. The impacts from the Proposed Development that would be considered in the assessment include:

- Anticipated reductions in availability (stocks, production and/or sales) of materials regionally and nationally; and
- Anticipated reductions in the landfill void capacity of regional and national infrastructure.

12.7.7. The likely types and estimated quantities of material resources required (including site arisings generated) for the Proposed Development will be assessed. Impacts and effects will be evaluated against data for the regional and national materials markets, where information is available.

12.7.8. The likely types and estimated quantities of waste to be generated by the Proposed Development will be assessed. Impacts will be evaluated against the capacity of regional (or where justified, national) waste management infrastructure.

SIGNIFICANCE CRITERIA

12.7.9. The criteria for assessing sensitivity and magnitude of material and waste is taken from the IEMA Guide, For the purposes of the assessment, Method W1 (void capacity) will be used when assessing the magnitude of waste.

12.7.10. The outputs of comparing sensitivity against magnitude will be assessed against the significance of effects matrix provided within the IEMA Guide. Effects that are classified as moderate, large or very large are considered to be significant, for both materials and waste. Effects classified as slight or neutral are considered to be not significant in either case.

12.8. LIMITATIONS AND ASSUMPTIONS

12.8.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

MATERIALS

- The assessment of materials is based upon the validity of the collated information, regarding the resources that are expected to be consumed during the ‘in scope’ lifecycle phases of the Proposed Development.

- The assessment baseline uses the most recent available data, which is up to and including 2019 (unless stated otherwise).
- A lifecycle assessment (including embodied carbon and water) of materials has not been included, as the effort and resources required to complete such an exercise are deemed disproportionate to the benefit, they would offer the assessment of significance of effects.

WASTE

- The assessment of impacts and effects on landfill void capacity will be based upon the validity of the collated information, regarding the waste generated and disposed of by the Proposed Development during 'in scope' phases of the development.
- Waste data for North Wales / Wales is published in different formats and at different timeframes by comparison with data for North West England. The assessment baseline uses the most recent available data, which is up to and including 2019 (unless stated otherwise).
- Landfill operators can claim commercial confidentiality for their data at the time of submission to the Environment Agency; data for sites with a commercial confidentiality agreement in place are therefore unavailable for the analyses presented in this chapter.

12.9. References

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- **Ref. 12-20** NRW. (2020). *Remaining landfill void in Wales*. Retrieved from http://lle.gov.wales/catalogue/item/RemainingLandfillVoidInWales
- **Ref. 12-21** BRE Group. (2016). *BES 6001 The Framework Standard for Responsible Sourcing*. Retrieved from https://www.greenbooklive.com/filelibrary/responsible_sourcing/BES-6001--Issue-3.1.pd
- **Ref. 12-22** CL:AIRE. (2011). *The Definition of Waste: Development Industry Code of Practice*. Retrieved from https://www.claire.co.uk/projects-and-initiatives/dow-cop/28-framework-and-guidance/111-dow-cop-main-document

13. NOISE AND VIBRATION

13.1. INTRODUCTION

13.1.1. This Chapter considers the impact of the Proposed Development on Noise and Vibration. It sets out the baseline conditions, likely significant effects, mitigation and methodology proposed for the EIA on this topic.

13.2. STUDY AREA

13.2.1. The Study Area considered in the noise assessment for the construction phase of the Proposed Development is 300m from the Newbuild Infrastructure Scoping Boundary. BS5228:2009+A1:2014 states that at distances over 300m noise predictions have to be treated with caution.

13.2.2. Conversely, the study area in the vibration assessment for the construction phase of the Proposed Development is 100m from the Newbuild Infrastructure Scoping Boundary. It is anticipated that noise and vibration effects as a result of the construction activities would not be significant beyond these distances.

13.2.3. The Study Area for the operational noise assessment, related to any noise effects arising from the Grinsome Road, Alcohol Site and Flint above ground installations (AGIs) and Block Valve Stations (BVS), will be limited to 500m from the Newbuild Infrastructure Scoping Boundary.

13.3. BASELINE CONDITIONS

13.3.1. A desktop study has been prepared at this stage to identify Noise Important Areas (IAs) (**Ref. 13-1**) and Noise Action Plan Priority Areas (NAPPAs) (**Ref. 13-2**) based on the 3rd round noise mapping for the Environmental Noise Directive (END) (**Ref. 13-3**), legally in force in Wales and England through the Environmental Noise (Wales) Regulations (**Ref. 13-4**) and Environmental Noise (England) Regulations (**Ref. 13-5**).

13.3.2. The following IAs and NAPPAs have been identified within 500m from the Newbuild Infrastructure Scoping Boundary:

- IA ID 8912, road noise source next to the M56, owned by Highways England (HE);
- IA ID 7021, road noise source next to the A494, owned by HE;
- IA ID 7023 & 7024, road noise source next to the A41, owned by Cheshire West and Chester Council (CWCC);
- IA ID 7024, road noise source next to the A41, owned by CWCC;
- IA ID 10784, road noise source next to the A540, owned by CWCC;

- NAPPA ID 400, road noise source next to the A494, owned by Flintshire County Council (FCC);
- NAPPA ID 1317, road noise source next to the A494, owned by FCC;
- NAPPA ID 397, road noise source next to the A55, owned by FCC;
- NAPPA ID 399, road noise source next to the A494, owned by FCC;
- NAPPA ID 1507, road noise source next to the A494, owned by FCC;
- NAPPA ID 1318, road noise source next to the A494, owned by FCC; and
- NAPPA ID 403, road noise source next to the A494, owned by FCC.

13.3.3. Analysis of an address database will be undertaken during the EIA to assist the identification of noise sensitive receptors. The following sensitive receptors will be considered within the environmental impact assessment:

- Dwellings;
- Hospitals, schools, nurseries, elderly homes, places of worship, Public Right of Ways, heritage assets; and
- Locations representative of biodiversity receptors near the AGIs.

13.4. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

13.4.1. The Overarching National Policy Statement or Energy EN-1 (**Ref. 13-6)** states that mitigation measures may include engineering methods, such as noise reduction at point of generation, considerations related to the layout, for instance to ensure adequate distance between source and sensitive receptor, and administrative restrictions for example by specifying noise limits.

13.4.2. The National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines EN-4 (**Ref. 13-7)** advises that typical noise mitigation measures include acoustic cladding for buildings, the use of sound attenuators on ventilation systems, acoustic lagging on pipework, multi-stage control valves, gas turbine exhaust silencers, acoustic enclosures on pumps, low speed cooler fans and the use of electric rather than gas powered compressors.

13.4.3. Some of the opportunities for mitigation during the construction phase of the Proposed Development are likely to include Best Practicable Means (BPM), examples of which are presented below:

- Prior consent agreement for any works outside core hours, where there is potential for significant adverse effects;
- Contact details for nominated site contact for local residents to deal with complaints and engaging with local residents;
- Selection of quiet and low noise equipment and methodologies;
- Optimal location of acoustic screening to minimise noise adverse effects;
- Optimal location of equipment on site to minimise noise disturbance;

- The provision of acoustic enclosures around static plant, where necessary; and
- Use of less intrusive alarms, such as broadband vehicle reversing warnings.

13.4.4. Some of the opportunities for mitigation during the operational phase of the project are likely to include acoustically designed enclosures within the AGIs and increasing the distance to noise sensitive receptors.

13.5. DESCRIPTION OF LIKELY SIGNIFICANT EFFECTS

13.5.1. Potential effects identified in the National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines EN-4 (**Ref. 13-7)** will be considered. The likely significant effects associated with the construction phase will potentially relate to:

- Noise and vibration from the construction activities associated with Horizontal Direct Drilling (HDD) for special crossings, where applicable;
- Noise and vibration from the construction activities associated with vegetation removal, excavation and soil backfilling;
- Noise and vibration from the construction activities associated with AGIs and BVS;
- Noise and vibration from the construction activities associated with construction compounds; and
- Noise and vibration from the construction activities associated with heavy vehicle movements.

13.5.2. It is anticipated that any potential noise and vibration effects arising from the construction phase of the Proposed Development will be of temporary nature for the duration of the construction phase, currently planned for approximately 18 months.

13.5.3. The likely significant effects associated with the operation phase will potentially relate to noise associated with the operation of the AGIs and BVS.

13.5.4. It is anticipated that any potential noise and vibration effects arising from the operation phase of the Proposed Development will be of long-term nature until decommissioning.

13.5.5. The Impacts scoped in or out for noise and vibration are shown in **Table 13-1.**

Table 13-1: Elements Scoped in or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Noise and vibration impacts arising from Existing Pipeline Works (excluding BVS)	Construction Operation		✔	No physical works consented within this Application. Therefore, no impact pathways relevant to noise and vibration.
Noise and vibration impacts arising from the construction of the Proposed Development	Construction	✔		Construction traffic and activities for the Proposed Development have the potential to adversely affect nearby noise and vibration sensitive receptors. This will include construction traffic and activities associated with the carbon dioxide pipeline, AGIs and BVS.
Noise impacts arising from the operation of the Proposed Development	Operation	✔		Operation of the AGIs and BVS have the potential to adversely affect nearby noise sensitive receptors.
Road traffic Noise impacts arising from the operation of the Proposed Development	Operation		✔	Road traffic movements during operation of the Proposed Development are not expected to generate to adversely affect nearby noise sensitive receptors.

Element	Phase	Scoped In	Scoped Out	Justification
Vibration impacts arising from the operation of the Proposed Development	Operation		✔	The activities associated with the operational development are not expected to generate significant vibration levels.

13.6. OPPORTUNITIES FOR ENHANCING THE ENVIRONMENT

13.6.1. There are limited opportunities for enhancement with respect to noise and vibration other than the mitigation measures previously discussed in Section 13.4 of this chapter.

13.7. PROPOSED ASSESSMENT METHODOLOGY

13.7.1. A baseline noise survey will be undertaken in accordance with BS7445:2003 (**Ref. 13-8**), BS4142:2014+A1:2019 (**Ref. 13-9**) and BS5228:2009+A1:2014 (**Ref. 13-10**) to establish the existing noise climate at locations key representative of the nearest noise sensitive receptors.

13.7.2. The Environment Health Departments at CWCC and FCC will be consulted to agree the representative locations and duration of the noise survey. It is anticipated that the continuous unattended noise measurements will be carried out over one week supplemented with short-term attended noise measurements. The baseline noise survey will include logging of observations and weather conditions to remove potential periods of heavy rain or high wind speeds.

13.7.3. A quantitative assessment will be undertaken of potential construction noise and vibration impacts following the guidance set out in BS5228-1 and 2:2009+A1:2014 – Code of Practice of noise and vibration control on construction and open sites (**Ref. 13-10**).

13.7.4. A 3D computer noise model built using CadnaA software and ArcGIS will be used to determine the predicted construction noise levels associated with the Proposed Development. Modelling scenarios will be prepared with a typical configuration of plant items for key stages of the construction phase which is planned for approximately 18 months. A complete list of construction plant items will be defined in the ES, it is anticipated that construction activities such as vegetation clearance, HDD, excavation and soil backfilling are likely to be included in the noise model. In Addition, potential noise impacts arising from

heavy vehicle movements, and the construction of AGIs, BVS and construction compounds will be included in the assessment.

13.7.5. A noise model will be also prepared to determine any likely noise impacts arising from the operation of the Proposed Development, specifically for the operation of the AGIs and BVS. The model will include the information from the design process including geo-referenced plant items, heights and sound power levels. The noise propagation will be calculated in line with ISO9613 Part 2 (**Ref. 13-11**) and assessed against guidance in BS4142:2014+A1:2019 (**Ref. 13-9**) for human receptors.

13.7.6. The outcome of the noise model will be used to inform the Project Team on the magnitude of noise levels predicted at ecological receptors near the AGIs and BVS. The impact assessment of these receptors will be presented in the Ecology Chapter of the Environmental Statement (ES).

13.7.7. Where necessary, the assessment will outline noise and vibration mitigation measures. The noise model will be used to quantify the acoustic benefits of these measures.

13.7.8. The significance criteria for both construction and operation phases will be discussed and agreed with CWCC FCC. It is anticipated that the principles in the Noise Policy Statement for England (NPSE) (**Ref. 13-12**) and the Noise and Soundscape Action Plan 2018-2023 (**Ref. 13-13**), the Overarching National Policy Statement or Energy EN-1 (**Ref. 13-6**) and the National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines EN-4 (**Ref. 13-7**) will be considered.

13.8. LIMITATIONS AND ASSUMPTIONS

13.8.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- Noise surveys are proposed on the basis that the noise climate during early stages of the EIA process will be representative of the typical baseline conditions. Should any events, such as COVID-19 restrictions, indicate that a baseline noise survey has the potential to capture conditions that are not typical, then an alternative approach will be discussed and agreed with the Environment Health Departments at CWCC FCC; and
- Current design information at the time of preparing this EIA Scoping Report is preliminary. The assessment presented in the Preliminary Environmental Information (PEIR) and ES will include the latest design information available at the time of our submission. Where design information is not available, worst case assumptions will be made.

13.9. REFERENCES

- **Ref. 13-1** DEFRA (2020) Noise Action Planning Important Areas Round 3 England https://data.gov.uk/dataset/948d6c4c-772e-4f55-9f39-97508e1cc701/noise-action-planning-important-areas-round-3-england
- **Ref. 13-2** Lle (2017) Environmental Noise Mapping 2017 https://lle.gov.wales/catalogue/item/EnvironmentalNoiseMapping2017/?lang=en
- **Ref. 13-3** European Commission (2002) Directive 2002/49/EC of the European Parliament relating to the assessment and management of environmental noise http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0049:en:NOT
- **Ref. 13-4** UK Government (2009) The Environmental Noise (Wales) (Amendment) Regulations 2009 https://www.legislation.gov.uk/wsi/2009/47/made
- **Ref. 13-5** UK Government (2018) The Environmental Noise (England) (Amendment) Regulations 2009 https://www.legislation.gov.uk/uksi/2018/1089/made
- **Ref. 13-6** Overarching National Policy Statement or Energy EN-1, 2011, Department of Energy and Climate Change
- **Ref. 13-7** National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines EN-4, 2011, Department of Energy and Climate Change
- **Ref. 13-8** BS 7445 (2003): Description and Measurement of Environmental Noise
- **Ref. 13-9** BS 4142 (2014) + A1 (2019): Methods for rating and assessing industrial and commercial sound
- **Ref. 13-10** BS 5228, Parts 1&2 (2009) + A1 (2014): Noise and Vibration Control on Construction and Open Sites
- **Ref. 13-11** ISO 9613 (1996): Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation
- **Ref. 13-12** Noise Policy Statement for England (2010), Defra
- **Ref. 13-13** Noise and Soundscape Action Plan, 2018-2023, Welsh Government

14. POPULATION AND HUMAN HEALTH

14.1. INTRODUCTION

14.1.1. This Chapter considers the impact of the Proposed Development on Population and Human Health. It sets out any potential significant effects during construction and operation and outlines the proposed methodology for the Population and Human Health assessment and identifies those impacts that can be scoped out of the EIA.

14.2. STUDY AREA

14.2.1. The Study Area for Population and Human Health is detailed below for each element of the assessment. This has been defined using the Design Manual for Roads and Bridges (DMRB) guidance Volume 11, Section 3, Part 6, LA112 Population and Human Health (**Ref. 14-1**).

LAND USE AND ACCESSIBILITY

14.2.2. The Study Area for land use related assessments has been defined using DMRB guidance LA112 Population and Human Health (**Ref. 14-1**). Despite the DMRB being the standard for assessment of road schemes, this guidance provides the best methodology for assessing Population and Health in the context of the Proposed Development. In line with DMRB guidance, the following study areas have been identified for the land use and accessibility elements of the assessment.

- Private property and housing: Land parcels of properties and land owned by private landowners that lie within 500m of the Newbuild Infrastructure Scoping Boundary, or those which have a direct means of access within the Newbuild Infrastructure Scoping Boundary.
- Community land and assets: Community land, community and recreational facilities located within 500m of the Newbuild Infrastructure Scoping Boundary, or those which have a direct means of access within the Newbuild Infrastructure Scoping Boundary.
- Development land and businesses: Land parcels and businesses located within 500m of the Newbuild Infrastructure Scoping Boundary, or those which have a direct means of access within the Newbuild Infrastructure Scoping Boundary.
- Agricultural Land Holdings: Agricultural land holdings within 500m of the Newbuild Infrastructure Scoping Boundary that would be directly affected, or those which have a direct means of access within the Newbuild Infrastructure Scoping Boundary.

- Public Access for Walkers, Cyclists and Horse Riders: A 500m study area around the Newbuild Infrastructure Scoping Boundary will be used for the assessment of change in accessibility and amenity value of routes used by walkers, cyclists, and horse riders (WCH) and Public Rights of Way (PRoW). Based on professional judgement, it is considered that this is a suitable area within which there is a likelihood of receptors to be affected by the Proposed Development.

HEALTH

14.2.3. For the human health assessment, the Study Area has been determined by the extent and characteristics of the Proposed Development, and the communities directly and indirectly affected by the Proposed Development. The smallest jurisdiction boundaries for the Proposed Development are Lower Layer Super Output Areas (LSOA) which lie within or adjacent to the Newbuild Infrastructure Scoping Boundary. Where possible, they form the basis of the Study Area for health because they are the communities that are most likely to experience direct and / or greater impacts. Where data is unavailable at an LSOA level, ward level data will be used.

14.2.4. Datasets for larger jurisdiction boundaries have been used for the purposes of this Scoping chapter, given the linear route and different route options mean there are a considerable number of potential LSOAs. At the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES) stages, LSOA data will be used for analysis, whereas this EIA Scoping Report presents a broader overview of baseline data as a means of comparison between geographical areas.

14.2.5. The various area profiles are as follows:

- National: England; Wales
- Regional: North West, North Wales;
- County: Cheshire West and Chester (England), Flintshire (Wales); and
- Wards: Gowy, Sandstone, Helsby, Saughall & Mollinton, Upton, Newton & Hoole, Blacon (Cheshire West and Chester); and Sealand, Shoton East, Shoton West, Queensferry, Higher, Wepre, Central, South, Golftyn, Connah's Quay, Northrop Hall, Northrop, Okenholt, Ewloe, Aston, and Mancot (Flinshire).

14.3. BASELINE CONDITIONS

LAND USE AND ACCESSIBILITY

14.3.1. The following data sources have been consulted to inform the land use and accessibility baseline review:

- Google Maps (**Ref. 14-2**);

- Cheshire West and Chester Mapping – Local Plan Interactive Map (**Ref. 14-3**) and;
- Lle Geo-Portal (**Ref 14-4**).

Private Property and Housing

14.3.2. Private property is residential land that does not accommodate public space or any other community facility or asset or land allocated within planning policy for residential development. Commercial property is considered under the 'Development Land and Businesses' section below.

14.3.3. A large proportion of the surrounding land use is residential, so there are numerous private properties immediately adjacent and in close proximity to the Newbuild Infrastructure Scoping Boundary, within the Study Area. Similarly, there are road crossings which provide direct access to a number of private properties along the length of the carbon dioxide route options.

14.3.4. There are no housing land allocations of relevance to the Proposed Development which lie within the Study Area.

Community Land and Assets

14.3.5. Community assets identified within the Study Area include the following:

- Post Offices, local shops and independent convenience retailers;
- A number of education facilities including nursery and primary schools;
- Public Open Spaces, parks and gardens, golf courses and fisheries;
- Churches, graveyards, and other places of worship;
- A number of nursing homes; and
- Sports grounds, sport training facilities and clubs.

14.3.6. There is also a large amount of urban and semi-rural greenspace within the Study Area surrounding the Newbuild Infrastructure Scoping Boundary, including along the River Dee, as well as allotments and specialist recreational assets, such as Chester Zoo.

Development Land and Businesses

14.3.7. There are a number of employment land designations located within or adjacent to the Study Area.

14.3.8. A considerable number of independent businesses including garden centres, vehicle repair and rental, industrial premises, business parks, hotels and bed and breakfasts, and restaurants are located within the Newbuild Infrastructure Scoping Boundary and wider Study Area.

Agricultural Land Holdings

14.3.9. The Proposed Development is predominantly a linear route, with the Study Area passing through a diverse mix of semi-rural, and urban residential and commercial areas. As such, there is a mix of land classifications, with some land within the Study Area classified as Urban (non-agricultural) by Agricultural Land Classification (ALC) guidance (**Ref. 14-5**) and the remainder as predominantly level 3 (good to moderate) and level 4 (poor) agricultural land. A variety of agricultural fields would be crossed by the Proposed Development and there are several farms located within or adjacent to the Newbuild Infrastructure Scoping Boundary.

Walkers, Cyclists and Horse-riders (WCH)

14.3.10. There are a considerable number of PRoW within the Study Area which have been identified using the Cheshire West and Chester Definitive PRoW Map (**Ref. 14-3**) and Natural Resources Wales PRoW Map (**Ref. 14-6**). These include (but are not limited to): footpaths, non-definitive footpaths, non-definitive byways and permissive footpaths.

14.3.11. The Cheshire West and Chester Definitive PRoW Map also shows numerous bridleways and paths suitable for cycling, including traffic-free paths and advisory routes, within the Study Area. There are several designated long distance Sustrans National Cycle Network routes (**Ref. 14-7**) within the Study Area.

HUMAN HEALTH

14.3.12. The following data sources have been consulted to inform the human health baseline review:

- Public Health England, Local Health Profile – Cheshire West and Chester (2019) (**Ref. 14-8**);
- Ministry of Housing, Communities & Local Government, English Indices of Deprivation 2019 (**Ref. 14-9**);
- NOMIS, Labour Market Profiles (**Ref. 14-10**);
- Public Health Wales Local Authority Health Outcomes Profiles (**Ref. 14-11**); and
- Extrium England and Wales Noise and Air Quality Planning Areas (**Ref. 14-12**).

Age Breakdown

14.3.13. The percentages of population per age group for Cheshire West and Chester, Flintshire, the North West, Wales and England can be seen in **Table 14-1.**

Table 14-1: Age Breakdown by Geographical Area (given in %)

	Cheshire West and Chester	Flintshire	North West	Wales	England
Under 16	17.6	18.8	18.8	18.2	18.9
16-24	10.8	10.8	12.2	12.2	11.9
25-64	53.0	52.8	52.4	51.3	52.9
65-84	16.1	15.5	14.4	15.9	14.1
85 and over	2.4	2.1	2.1	2.4	2.2

Life Expectancy

14.3.14. Within Cheshire West and Chester, the life expectancy at birth for males and females is slightly higher than that within the North West region. For males, life expectancy is also slightly higher than the national average.

14.3.15. Within Flintshire, life expectancy for males and females is slightly higher than the Wales average, as shown in **Table 14-2.**

Table 14-2: Life Expectancy by Geographical Area

	Cheshire West and Chester	Flintshire	North West	Wales	England
Life expectancy at birth (males)	79.9	79.3	78.3	78.3	79.6
Life expectancy at birth (females)	83.0	82.4	81.9	82.3	83.2

Public Health Profile

14.3.16. The local authority health profile for Cheshire West and Chester indicates that the majority of health indicators for the borough are in line with the North West averages.

14.3.17. Public Health Wales does not release health profiles in the same way as Public Health England; however, it does publish local authority data on mental wellbeing; noted to be one of the key health outcomes which is important for the people of Wales. Flintshire ranks the highest of all 22 Welsh local authorities, and significantly higher than the Wales average.

Qualifications and Economic Activity

14.3.18. The proportion of the population within Cheshire West and Chester who hold a National Vocational Qualification (NVQ) Level 4 Qualification or above (degree level) (29.4%) is somewhat higher than the regional and England levels and significantly higher than the neighbouring local authority of Flintshire (22.4%). Conversely, Flintshire has the highest proportion of residents with Level 1 Qualifications (15.4%) compared with Chester West and Cheshire (13.3%).

14.3.19. The number of people aged 16-64 years old who are economically active is 63.2% in Cheshire West and Chester (broadly in line with the England rate of 63.6%), and 64.1% in Flintshire (somewhat higher than the Wales rate of 59.3%).

Air Quality, Noise and Landscape

14.3.20. There are no Air Quality Management Areas located within Flintshire, however there are two AQMAs established by Cheshire West and Chester Council for controlling NO_2, that fall within the Study Area. There are six Noise Important Areas and seven Noise Action Plan Priority Areas within the Study Area.

14.3.21. A full review of baseline conditions for air quality, noise and landscape receptors are outlined in **Chapter 5: Air Quality** and **Chapter 13: Noise and Vibration** of this EIA Scoping Report.

14.4. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION

14.4.1. Relevant mitigation measures will be identified in the ES. This mitigation will be reviewed and refined as part of the EIA process, as the design progresses. Measures may include:

- Appropriate diversions implemented for any PRoW obstructed during construction in order to minimise effects on accessibility and severance for WCHs. Where appropriate diversions are not available, temporary closures may be required;
- Any PRoW, footway or carriageway diversions or closures undertaken during construction to be clearly advertised and signed prior to commencement of works. The signage should display the temporary diversion routes in place;

- Design of the diverted routes for WCH to consider vulnerable user groups and ensure accessibility is maintained for users with limited mobility where practicable;
- Liaison with residents, businesses and other user groups prior to the commencement of construction works to ensure they are aware of the programme and nature of the works, in particular, any works which are planned to take place at night. Any out of hours construction work to be agreed with Cheshire West and Chester Council and Flintshire County Council (as relevant) in advance;
- Accesses to residential and commercial properties will be maintained throughout the construction period, in agreement with occupants;
- Good practice measures outlined within the Construction Environmental Management Plan and Construction Traffic Management Plan would be implemented in order to avoid conflict with WCHs, local residents and nearby businesses; and
- Health related mitigation measures are presented in **Chapter 5: Air Quality** and **Chapter 13: Noise and Vibration** of this EIA Scoping Report.

OPERATION

- Health related mitigation measures are presented in **Chapter 5: Air Quality** and **Chapter 13: Noise and Vibration** of this EIA Scoping Report.

14.5. DESCRIPTION OF LIKELY EFFECTS

14.5.1. The nature and scale of likely effects on Population and Human Health have been identified in this EIA Scoping Report as advised in the DMRB LA112 guidance (**Ref. 14-1**).

14.5.2. The elements scoped in or out for Population and Human Health are as follows:

Table 14-3: Elements Scoped In or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Population and human health impacts arising from Existing Pipeline Works (excluding Block Valve Stations)	Construction Operation		✔	No physical works consented within this Application. Therefore, no impact pathways relevant to population and human health.
Private Property and Housing	Construction	✔		There is potential for adverse effects on private property as a result of the construction of the Proposed Development.
Community Land and Assets	Construction	✔		There is potential for adverse effects on community land and assets as a result of the construction of the Proposed Development.
Community Land and Assets	Operation		✔	Access to community land and assets will be permanently maintained during the operation of the Proposed Development. The potential loss in visual amenity to community land and assets will be covered within the landscape and visual assessment (**Chapter 10: Landscape and Visual**). No significant operational effects have therefore been identified.
Development Land and Businesses	Construction Operation		✔	For businesses impacted by the construction of the Proposed Development, access to these assets be maintained throughout the construction period to avoid significant disruption which would affect business operations. Effects are therefore likely to be negligible or minimal and have been scoped out of further assessment. There are not anticipated to be operational effects on development land and businesses.
Agricultural Land Holdings	Construction Operation		✔	There is potential for adverse effects on agricultural land holdings along the route alignment during construction, however, these are likely to be negligible or minimal as best practice techniques will be used. Once operational the land tunnelled for the cable route will be reinstated, allowing normal agricultural use to resume, and hedges, fences and other features will be replanted and replaced. Therefore, the baseline environment is not anticipated to change materially, and no significant effects have been identified.
Public Access for WCHs	Construction	✔		There is potential for adverse effects on the accessibility of publicly accessible routes for WCHs.
Public Access for WCHs	Operation		✔	There are not anticipated to be significant effects on PRoW, as they would be returned to use or permanently diverted, and these are likely to be negligible or minimal and therefore have been scoped out of further assessment.
Health	Construction	✔		There is the potential for direct adverse effects on human health during both construction and operation of the Proposed Development.
Health	Operation		✔	Once operational, there are unlikely to be any significant effects on human health as the ground will be contained within the existing Flint-PoA pipeline route and the baseline environment is not anticipated to change materially.

14.6. OPPORTUNITIES FOR ENHANCING THE ENVIRONMENT

14.6.1. There are currently no known enhancements for population and human health proposed as part of the Proposed Development. However, opportunities to enhance population and human health may become apparent at a later stage.

14.6.2. The Project itself will, however, provide wider environmental benefits through reduce carbon dioxide emissions from industry, homes and transport, whilst supporting economic growth in the North West of England and North Wales.

14.7. PROPOSED ASSESSMENT METHODOLOGY

14.7.1. As stated in the EN-1, where a proposed project has an effect on human beings, the PEIR and ES should assess these effects for each element of the project, identifying any adverse health impacts. In line with this, the Population and Health chapter will assess the potential human health impacts of the Proposed Development and identify appropriate measures to mitigate these impacts.

14.7.2. EN-1 also outlines that where project is likely to have socio-economic impacts at local or regional levels, the applicant should undertake an assessment of these impacts as part of the PEIR and ES. The potential impact on local businesses has been considered within this EIA Scoping Report, however, these have been scoped out of further assessment within the PEIR and ES.

14.7.3. The following methodology for the assessment of likely significant effects is proposed in accordance with DMRB Volume 11, Section 2, Part 4 LA104 (**Ref. 14-13**) (Environmental Assessment and Monitoring) and DMRB Volume 11, Section 3, Part 6 LA112 (Population and Human Health) (**Ref. 14-1**):

LAND USE AND ACCESSIBILITY

Private Property and Housing

- The assessment will identify disruption to access, likely severance and the extent and level of housing land lost as a result of the Proposed Development. The location and likely effects on residential development land will also be assessed.

Community Land and Assets

- The assessment will identify the location and level of use of community land and assets. The impacts on the public will be set out in terms of accessibility restrictions / severance and changes to amenity.

Walkers, Cyclists and Horse-riders (WCH)

- The assessment will identify likely routes taken by WCHs. If the information is available, the frequency of use for these routes will be determined in

consultation with Cheshire West and Chester, and Flintshire Councils. The assessment will set out the impact on WCH receptors according to change in journey length.

HUMAN HEALTH

- A qualitative assessment will be undertaken to determine effects of the Proposed Development on human health during construction. Changes to health determinants as a result of the Proposed Development will be identified using appropriate information from ES topics and any other available information regarding health;
- Health determinants likely to be affected by the Proposed Development, and therefore included in the assessment of human health include air quality; noise; visual amenity; accessibility to community, healthcare, social and employment facilities; and opportunities for physical activity;
- The sensitivity of the population will be determined using professional judgement applied to the health profile presented in the baseline, and reported as negligible, low, medium, or high; and
- A health receptors' sensitivity is based on their ability to experience a potential impact without incurring a substantial change to their health status. Several elements will be used to determine receptor value including level of deprivation and accessibility.

SIGNIFICANCE CRITERIA

- For land use and accessibility, sensitivity criteria and magnitude of impact will be assigned according to Table 3.11 and Table 3.12 in the DMRB, Part 6, LA112 guidance (**Ref. 14-1**);
- For land use and accessibility, level of significance will be assigned according to Table 3.8.1 in the DMRB, Part 4, LA104 (**Ref. 14-13**) guidance; and
- Significant effects for land use and accessibility, comprise effects which are assigned as moderate, large or very large. The remaining effects will be categorised as non-significant.
- In terms of health, outcomes will be determined in accordance with Table 3.32 in the DMRB Part 6 LA112 (**Ref. 14-1**) guidance.

LEGISLATION AND POLICY

14.7.4. The following legislation and policy are of relevance to Population and Human health and will be considered in the EIA:

- Directive and legislation:
  - Countryside and Rights of Way Act (2000) (**Ref. 14-14**);
  - Equality Act (2010) (**Ref. 14-15**); and

- Localism Act (2011) (**Ref. 14-16**).

- National Planning Policy:
  - National Planning Policy Framework (2012, updated 2019) (**Ref. 14-17**);
  - Planning Practice Guidance (2014) (**Ref. 14-18** and **Ref. 14-19**);
  - Fair Society, Health Lives, The Marmot Review 10 Years On (2020) (**Ref. 14-20**); and
  - Public Health Outcomes Framework (2019) (**Ref. 14-21**).
- Local Planning Policy:
  - Cheshire West and Chester adopted development plan, Strategic Policies, and Land Allocations and Detailed Policies;
  - Cheshire West and Chester Supplementary Planning Guidance Documents;
  - Flintshire Local Development Plan draft documents, Flintshire Unitary Development Plan; and
  - Flintshire Supplementary Planning Guidance Documents.

CONSULTATION

14.7.5. There has been no statutory consultation undertaken to date to inform this EIA Scoping Report. As the EIA progresses, consultation will be undertaken with likely effected user groups. These may include; resident associations, business owners and WCHs, as well as Cheshire West and Chester, and Flintshire Councils as necessary.

14.8. LIMITATIONS AND ASSUMPTIONS

14.8.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- There is limited information on landowners and business at this stage. These will be further assessed in the ES to identify potential effects on private property and development land and businesses;
- The ES assessment would rely, in part, on data provided by third parties (e.g. OS Mapping, Local Authorities, NOMIS, PHE) which are the most up-to-date, available at the time of the assessment. No significant changes or limitations in these datasets have been identified that would affect the robustness of the assessment for EIA purposes;
- The impact on users of community assets would be based on desktop study in the ES. No consultation would be undertaken to verify user levels;
- Population impacts would be identified in the ES down to the lowest defined population group available according to Office for National Statistics (ONS) survey outputs (lower super output areas). Further granularity of data is not

available. No significant changes or limitations in these datasets have been identified that would affect the robustness of the assessment for EIA purposes; and

- Vulnerable groups, including those with protected characteristics as defined by the Equality Act 2010, would be assumed to be present throughout the Study Area, additionally where specific areas have been identified as deprived, these areas will be emphasised.
- COVID-19 has led to unprecedented changes in working patterns, employment and travel needs, over a short period of time. There is a great deal of uncertainty as to how these changes will continue to develop over the medium and long term, particularly over the period covered by the EIA. Where relevant, this will be considered further as part of the preparation of the PEIR and ES and any assumptions that are required to ensure a robust assessment will be explained.

14.9. REFERENCES

- **Ref. 14-1** Highways England, LA 112 Population and Human Health, Design Manual for Roads and Bridges, Volume 11, Section 2, Part 6 (January 2020)
- **Ref. 14-2** Google Maps. Available at: https://www.google.co.uk/maps (Accessed 9 March 2020)
- **Ref. 14-3** Cheshire West and Chester Mapping. Available at: https://maps.cheshirewestandchester.gov.uk/cwac/localplan
- **Ref. 14-4** Welsh Government and Natural Resources Wales, Lle Geo-Portal. Available at: http://lle.gov.wales/map#m=-3.26406,53.23697,12&b=europa (Accessed April 2021)
- **Ref. 14-5** Ministry for Agriculture, Fisheries and Food (1988) Agricultural Land Classification of England and Wales – Revised Criteria for Grading the Quality of Agricultural Land
- **Ref. 14-6** Natural Resources Wales – Public Rights of Way in Wales. Available at: https://naturalresources.wales/days-out/recreation-and-access-policy-advice-and-guidance/managing-access/public-rights-of-way/?lang=en (Accessed March 2021)
- **Ref. 14-7** Sustrans North West England National Cycle Network map. Available at: https://www.sustrans.org.uk/find-a-route-on-the-national-cycle-network/?location=North+West+England&routetype=null&distance=null&p=1. (Accessed March 2021)
- **Ref. 14-8** Public Health England, Local Health Profile – Cheshire West and Chester. Available at: https://fingertips.phe.org.uk/static-reports/health-profiles/2019/E06000050.html?area-name=Cheshire%20West%20and%20Chester (Accessed March 2021)

- **Ref. 14-9** Ministry of Housing, Communities & Local Government, National Statistics, English Indices of Deprivation 2019. Available at: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019 (Accessed March 2021)
- **Ref. 14-10** NOMIS, Labour Market Profiles. Available at: https://www.nomisweb.co.uk/reports/lmp/la/1946157127/report.aspx (Accessed March 2021)
- **Ref. 14-11** Public Health Wales Local Authority Health Outcomes Profiles – Flintshire. Available at: https://public.tableau.com/profile/publichealthwalesobservatory/vizhome/PHOF2017SubLA-HOME/Home#!/vizhome/PHOF2017LAHB-Charts/UHB-LAChart-Table. (Accessed March 2021)
- **Ref. 14-12** Extrium Defra England Noise and Air Quality Planning Areas. Available at: http://www.extrium.co.uk/noiseviewer.html (Accessed April 2021).
- **Ref. 14-13** LA 104 - Environmental assessment and monitoring - DMRB (standardsforhighways.co.uk)
- **Ref. 14-14**; Countryside and Rights of Way Act, 2000, Chapter 37, Available at: http://www.legislation.gov.uk/ukpga/2000/37/enacted (Accessed: March 2021)
- **Ref. 14-15** Equality Act, 2010, Chapter 15, Available at: http://www.legislation.gov.uk/ukpga/2010/15/contents (Accessed: March 2021)
- **Ref. 14-16** Localism Act, 2011, Chapter 20, Available at: http://www.legislation.gov.uk/ukpga/2011/20/contents (Accessed: March 2021)
- **Ref. 14-17** Department for Communities and Local Government, Revised National Planning Policy Framework (February 2019)
- **Ref. 14-18** Ministry of Housing, Communities & Local Government, Planning Practice Guidance – Open space, sports and recreation facilities, public rights of way and local green space (2014) Available at: https://www.gov.uk/guidance/open-space-sports-and-recreation-facilities-public-rights-of-way-and-local-green-space (Accessed: March 2021)
- **Ref. 14-19** Ministry of Housing, Communities & Local Government, Planning Practice Guidance - Health and wellbeing (2014) Available at: https://www.gov.uk/guidance/health-and-wellbeing (Accessed: March 2021)
- **Ref. 14-20** The institute of Health and Equality Fair Society Healthy Lives (Marmot Review 10 Years On) Available at: http://www.instituteofhealthequity.org/resources-reports/marmot-review-10-years-on (Accessed: March 2021)

- **Ref. 14-21** Public Health England, Public Health Outcomes Framework. Available at: https://fingertips.phe.org.uk/profile/public-health-outcomes-framework (Accessed: March 2021)

15. TRAFFIC AND TRANSPORT

15.1. INTRODUCTION

15.1.1. This Chapter considers the impact of the Proposed Development on Traffic and Transport. It sets out the proposed Study Area, outlines the baseline conditions, shows early consideration of mitigation measures, looks at the likelihood of significant effects, and outlines the proposed methodology of the EIA.

PRE-SCOPING STAKEHOLDER DISCUSSIONS

15.1.2. The Traffic and Transport team have held initial discussions with local highway authorities as follows:

- Meeting with Flintshire County Council on Wednesday 12th May 2021; and
- Meeting with Cheshire West and Chester Council on Friday 14th May 2021.

15.1.3. The purpose of these meetings was to introduce the project to key stakeholders in advance of formal issue of the EIA Scoping Report. The approach to assessment and topic specific issues such as methods of construction and survey data collection were discussed.

15.1.4. All parties confirmed a willingness to work collaboratively to ensure robust assessment work and to maintain an ongoing dialogue as the application develops.

15.1.5. Further discussions will be held with other key stakeholders such as Highways England (HE) and the North and Mid Wales Trunk Road Agent (NMWTRA) in due course.

15.2. STUDY AREA

15.2.1. Traffic and transport effects will be limited to the construction phase of the Proposed Development, where the impacts will be direct or indirect. Direct impacts will occur where the Proposed Development crosses, or is located along, a key transport receptor, such as a road or rail line. Indirect impacts will occur where construction traffic use the existing highway network and thereby increases traffic volumes and potentially the proportion of Heavy Goods Vehicles (HGVs).

15.2.2. The IEMA Guidelines for the Environmental Assessment of Road Traffic (1993) (**Ref. 15-1**) state that study areas should include road links on the basis of two 'rules of thumb', described as follows:

- Rule 1: Include highway links where total traffic flows are predicted to increase by more than 30% (or where the number of Heavy Goods Vehicles (HGVs) is predicted to increase by more than 30%); and

- Rule 2: Include any specifically sensitive areas where traffic flows are predicted to increase as a consequence of a development by 10% or more. Sensitive areas may be defined as locations near to more vulnerable user groups, such as school children, people with disabilities or the elderly, or accident black spot areas, roads at or near capacity, or links with high pedestrian flow.

15.2.3. Construction traffic will need to access working areas and construction compounds through temporary access points and potentially bespoke haul routes that would not have public access. The precise locations of these are not known at this point, and as such, a wider zone of influence for where transport effects may be realised has informed this chapter. The Study Area (Zone of Influence) for the Traffic and Transport EIA is presented in **Figure 15-1** in **Appendix A: Figures**.

15.2.4. It is likely that as the design of the Proposed Development progresses and there is more certainty around construction methods and logistics, including consideration of working areas and compounds, the wider zone of influence will be adapted (likely resulting in a decrease in the area to be covered).

15.3. BASELINE CONDITIONS

15.3.1. Baseline conditions for the traffic and transport zone of influence have been established as part of a desk-based review using available resources; including online mapping tools such as Google Earth/ Maps, Flintshire County Council and Cheshire West and Chester Council's publicly available GIS systems (**Ref. 15-2** and **15-3**), and Sustrans' National Cycle Network Map (**Ref. 15-4**). Online resources have also been referred to on the Welsh Government (NMWTRA) (**Ref. 15-5**) and Highways England (**Ref. 15-6**) websites. No quantified assessment has been undertaken at this stage to understand existing traffic flows.

HIGHWAY NETWORK

15.3.2. The highway network within the Newbuild Infrastructure Scoping Boundary comprises a range of roads of varying classification, from the Motorway Network (M56, M53, and A55) to unclassified rural lanes.

15.3.3. Broadly speaking, roads may be categorised as being within the Strategic Road Network (SRN) or Local Road Network (LRN). The SRN is comprised of the motorway network. These routes are not managed at the local authority level and are instead the responsibility of, in England, Highways England, and in Wales, the North and Mid Wales Trunk Road Agency (NMWTRA) on behalf of Welsh Government. These routes would form the entry and exit points for construction traffic within the Traffic & Transport study area; construction routes

will be identified to find the most appropriate routes along the LRN to the SRN from construction compounds and other working areas.

15.3.4. The SRN within the study area comprises the M56, M53, A5117, A550, A494, A55, and A41 (in part). The A55 and A594 cross administrative boundaries.

15.3.5. All other non-SRN routes are categorised as being within the LRN. Major routes within the LRN include the A540, A548, A5109, and A41. These routes are managed and maintained in Wales and England by Flintshire County Council and Cheshire West and Chester Council, respectively.

ROAD CROSSINGS AND IN-CARRIAGEWAY WORKS

15.3.6. The Newbuild Infrastructure Scoping Boundary includes approximately 40no. potential road crossings. Of these, three would cross the trunk road network at the M56, M53 and A494. Further 'A' Road crossings would be required at, for example, the A41, A540, A548, and A550. 'B' road network crossings include the B5129, B5125, and B5126. The remainder of road crossings would take place at classified unnumbered roads and unclassified roads.

15.3.7. The potential road crossings required, as a consequence of each proposed carbon dioxide pipeline section, is summarised in **Table 15-1** below.

Table 15-1: Potential Road Crossings and In-Carriageway Works

Project Section	Description
Grinsome Road AGI to Alcohols Site AGI carbon dioxide pipeline	This section of pipeline may include crossing the A5117, M56, and B5132 Cryer's Lane.
Alcohols Site AGI to Flint AGI carbon dioxide pipeline	This section of pipeline would require a significant number of road crossings but will depend on the route corridors chosen. Key crossings may include the M56 south of Elton, the M53 North East of Chester and near Wervin, the A41 near Backford, the A494 north of Ewloe, and the A5117. In-carriageway works may be required around the Church Lane (North of Ewloe) and B5129 Chester Road (Sandycroft).

RAIL CROSSINGS

15.3.8. The Newbuild Infrastructure Scoping Boundary includes potential crossing of the rail network in England and Wales. These include the London to Holyhead, Hooton to Helsby, Wrexham to Bidston and Chester to Liverpool Merseyrail Wirral Line.

WALKING AND CYCLING

15.3.9. In addition to the vehicular network, there are a number of walking and cycling routes within the Newbuild Infrastructure Scoping Boundary, many of which may interact with the carbon dioxide pipeline route corridors and/or construction traffic routes. These routes include the Public Right of Way (PRoW) network, Sustrans Cycle Network (including National, Regional and Local links), and the Wales Coast Path.

Public Rights of Way

15.3.10. There are a number of PRoW within the study area comprising footpaths, bridleways, restricted byways and byways open to all traffic ('BOAT') that are expected to interact with the Proposed Development. The likelihood and scale of impacts at individual PRoW will be considered following an on-site review of existing conditions and assessment of construction traffic along routes. It is expected that crossing of PRoW will require temporary closure, diversions and/or on-site management to mitigate impacts and minimise disruption to PRoW users.

Sustrans Cycle Network

15.3.11. The study area includes a number of sections of the National Cycle Network. The key routes within the study area include NCR5, NCR568 and NCR 563. These are a mix of traffic-free and on-road routes. The study area also includes regional routes not on the National Cycle Network linking NCR routes. These routes will also be taken into consideration when considering exposure to construction traffic, link sensitivities, impacts and mitigation. It is noted that interaction with the Proposed Development and associated construction traffic is not limited to crossing locations and will consider effects along the links themselves.

Wales Coast Path

15.3.12. The Wales Coast Path is an 870 mile long designated footpath following the Welsh coast. The Proposed Development will cross the route north of the river Dee in Flintshire. From this point running in a north westerly direction the path continues north of the A548 along the north wales coast to Talacre. Where it is crossed by the Proposed Development the path runs along approximately 3m shared footway/cycleway on a traffic free route between Saltney and

Queensferry. This section is also part of the National Cycle Route 586 referred to above.

15.4. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

15.4.1. Incorporated into the design of the Proposed Development will be a series of temporary access points which will provide access to working areas, construction compounds and haul roads. Careful consideration of the micro-siting of these temporary access points will be a key feature in terms of reducing the risk of adverse effects, with access points needing to incorporate appropriate visibility splays, turning radii and speed limit reductions where necessary/appropriate.

15.4.2. Outside of those design measures, the main mitigation for traffic and transport effects will be described within the Register of Commitments that will be submitted with the ES. The Register of Commitments will refer to mitigation plans (e.g. a Construction Traffic Management Plan (CTMP)) where identified as appropriate or necessary. This demonstrates compliance with guidance set out in the overarching National Policy Statement for Energy (EN-1). This document will provide a detailed description of the actions required by the main contractor during construction to meet the following objectives:

- Ensure that movements of people, plant and materials are achieved in a safe, efficient, timely and sustainable manner;
- Ensure that any impact to local communities and the local economy is reduced as far as reasonably practicable;
- Ensure that construction traffic levels do not exceed an acceptable level during network peak periods;
- Reduce and control construction vehicle trips where practical;
- Ensure that strategies and mitigation measures are implemented and adhered to through continued monitoring, review and improvement; and
- Limit the effects of construction traffic on the LRN.

15.5. DESCRIPTION OF LIKELY SIGNIFICANT EFFECTS

15.5.1. There are a range of potential traffic effects that could be caused by the Proposed Development prior to mitigation measures. These potential traffic effects are limited exclusively to the construction of the Proposed Development.

15.5.2. There are not anticipated to be any traffic effects during the operation (including maintenance) of the Proposed Development, and the assessment of potential effects relating to that is excluded from the traffic and transport assessment.

15.5.3. The following potential effects may be identified relating to traffic and transport.

- Severance;
- Driver Delay;
- Pedestrian Delay;
- Pedestrian Amenity;
- Fear and Intimidation; and
- Highway Safety.

Table 15-2: Elements Scoped in or Out of Further Assessment

Potential Effect	Phase	Scoped In	Scoped Out	Justification
Traffic and transport impacts arising from Existing Pipeline Works (excluding Block Valve Stations)	Construction Operation		✔	No physical works consented within this Application. Therefore, no impact pathways relevant to traffic and transport.
Severance, Driver Delay, Pedestrian Delay, Pedestrian Amenity, Fear and Intimidation, Highway Safety	Construction	✔		Potential for temporary effects due to increases in traffic flow and changes to traffic composition (i.e. increased proportion of HGVs) through construction.
	Operation		✔	The operation of the Proposed Development will not result in increased traffic flow or changes to traffic composition.

15.7. OPPORTUNITIES FOR ENHANCING THE ENVIRONMENT

15.7.1. There are not anticipated to be any notable opportunities for enhancing the environment from a traffic and transport perspective. It may be that, in mitigating the effects realised by the Proposed Development, there are some permanent access improvements that could provide some local legacy benefit. At this point, these have not been assessed as being required or considered as to what they might incorporate and where they may be sited.

15.8. PROPOSED ASSESSMENT METHODOLOGY

15.8.1. The need for an assessment of Traffic and Transport effects for developments such as the Proposed Development is highlighted in several documents and guidance notes

15.8.2. The overarching National Policy Statement for Energy (EN-1) (Section 5.13.3) states:

"The applicant's ES should include a Transport Assessment, using the NATA/ WebTAG[10] methodology stipulated in the Department for Transport's guidance"

15.8.3. The Ministry of Housing, Communities, and Local Governments Guidance on Travel Plans, Transport Assessments, and Statements (2014) (**Ref. 15-7**) states:

"care should be taken to establish the full range of studies that will be required of development at the earliest opportunity as it is unlikely that a Transport Assessment or Statement in itself could fulfil the specific role required of a transport element of an Environmental Impact Assessment where this is required. Particular attention should be given to this issue where there are environmentally sensitive areas nearby and where the proposal could have implications for breach of statutory thresholds in relation to noise and air quality either as a result of traffic generated by the site or as a consequence of the impact of existing traffic on the site under consideration"

15.8.4. In relation to this, a key guidance document was produced by the Institute of Environmental Assessment (IEA), (now the Institute of Environmental Management and Assessment (IEMA)), in the form of 'Guidelines for the Environmental Assessment of Road Traffic' (1993) (**Ref. 15-1**) ('the IEMA Guidelines').

15.8.5. The IEMA Guidelines identify that the following environmental effects may be considered important when considering traffic from an individual development:

- Noise;

[10] WelTAG in Wales.

- Vibration;
- Visual Impacts;
- Severance;
- Driver Delay;
- Pedestrian Delay;
- Pedestrian Amenity;
- Hazardous Loads;
- Air Pollution;
- Dust and Dirt;
- Ecological Impact; and
- Heritage and Conservations.

15.8.6. Of these effects, many will be considered within other technical assessments of the ES. Whilst not on the recommended list within the IEMA Guidelines, reference is made to effects of Fear and Intimidation and Highway Safety, which are proposed to be assessed in the Environmental Statement (ES).

15.8.7. The ES will consider the specific effects set out in Paragraph 15.5.3, which are not covered by other technical disciplines within their assessments:

15.8.8. Notwithstanding the 'Rules of Thumb' presented in Paragraph 15.5.2, the ES will consider the effects arising from changes to total traffic and HGV volumes on all highway links that are identified for the routeing of construction traffic, irrespective of whether they exceed the two 'rules of thumb'. This will ensure that the possible environmental effects arising from all traffic associated with the Proposed Development are subject to robust assessment.

15.8.9. It is important to note that the guidelines do not distinguish between temporary and permanent changes in traffic flows, whereas, in reality, short duration increases are likely to be less disruptive and less impactful than permanent increases, and therefore less significant. Therefore, although the level of effect will be initially reported for a peak week of construction traffic, the methodology set out in the IEMA Guidelines assumes that traffic flow increases are permanent. As such, professional judgement will be applied which when considering the influence shorter durations are likely to have on the overall significance of effects.

15.8.10. Typically, when assessing the impacts of traffic effects, there are a range of particular groups and locations which may be sensitive to changes in traffic conditions compliant with the 'rules of thumb' previously outlined. These are outlined in the IEMA Guidance as 'Affected Parties', as follows:

- People at home;
- People in workplaces;

- Sensitive groups including children, elderly and disabled people;
- Sensitive locations, e.g. hospitals, churches, schools, historic buildings;
- People walking
- People cycling;
- Open spaces, recreational sites, shopping areas;
- Sites of ecological/nature conservation value; and
- Sites of tourist/visitor attraction.

15.8.11. The IEMA guidance states that this list of affected parties is not exhaustive. One affected party that is not on the list but would be considered in the ES assessment would be 'road users'.

15.8.12. All of the affected parties have one thing in common, which is that their potential exposure to changes in traffic volumes arises through their proximity to a construction traffic route. In the ES, a receptor will be defined not by individual affected party, but by location.

DATA SOURCES

15.8.13. Traffic count data will be captured for all highway links that will be identified as construction traffic routes. Automatic Traffic Count (ATC) data, using pneumatic tubes installed over the carriageway, will be used to derive 24 hour, 7 day per week flows, as well as traffic speed information. The ATC data will be classified in order to derive the proportions of Light Goods Vehicles (LGVs) and HGVs.

15.8.14. Personal injury accident (PIA) data will be requested from Cheshire West and Chester Council and Flintshire County Council. Data for the most recently available five-year period along all of the identified construction traffic routes will be analysed. If this information cannot be obtained, then accident data will be sourced using Crashmap.

VALUE AND SENSITIVITY OF RECEPTORS

15.8.15. As referred to earlier in this chapter, a receptor is defined not by an individual affected party, but by the transport link they are using at the time.

15.8.16. To expand on this, an individual cyclist (the affected party) might use multiple routes, some of which experience varying degrees of change to traffic flows as a consequence of the construction of the Proposed Development. It is considered inappropriate to take the highest degree of traffic flow change experienced by the cyclist and conclude that this is the impact of the construction of the Proposed Development, when there may be multiple routes used by the cyclist that have a considerably lower degree of change in traffic flows.

15.8.17. The proposed methodology will undertake a review of all construction traffic routes and each link (or, in the case of longer links with changing

characteristics, each section of link), has been given an overall level of sensitivity based on the character and the presence of certain receptors along the link. The sensitivity designation relates to the affected parties listed in the previous section.

15.8.18. Where a construction traffic route does not feature residential dwellings, footpaths, cycle paths or other features of the built environment likely to be used by affected parties, then it is will be determined as having a low sensitivity.

15.8.19. **Table 15-3** considers affected parties and built environment indicators and describes the rationale behind assigning overall highway link sensitivity to individual links.

Table 15-3: Categorising the Overall Sensitivity of a Highway Link

Affected Party	Built Environment Indicator along Highway Link	Highway Link Sensitivity to Changes in Traffic Flow
People at Home	Residential Properties	**Medium**: Where there are a number of properties with a direct frontage to the highway link being used as a construction route. **Low**: Where there are few properties with direct frontage to the highway link being used as a construction traffic route.
People in workplaces	Offices, industrial units, employment uses	**Low**
Sensitive groups (children, elderly and disabled people)	Schools, play areas, care/retirement homes, disabled parking bays	**High:** Where there are multiple indicators of sensitive groups with direct frontage onto the highway link being used as a construction traffic route. **Medium**: Where one indicator of sensitive groups is present with direct frontage onto the highway link being used as a construction traffic route **Low**: Where no indicator of sensitive groups are present

Affected Party	Built Environment Indicator along Highway Link	Highway Link Sensitivity to Changes in Traffic Flow
Sensitive locations (hospitals, places of worship, schools, historic buildings)	Hospitals, places of worship, schools, historic buildings	**High:** Where there are multiple indicators of sensitive locations. **Medium**: Where one indicator of a sensitive location is present **Low**: Where no indicator of sensitive locations are present
People walking	Footways, PRoW, crossings	**Medium**: Indicators present on highway link **Low**: Indicators not present on highway link
People cycling	On/off road designated cycle routes	**Medium**: On-road designated cycle routes present along highway link **Low**: Off-road designated cycle routes present along highway link
Open spaces, recreational sites, shopping areas	Parks, play areas, shops, community centres	**High:** Where there are multiple instances or indicators likely to be used by sensitive groups (i.e. children) **Medium**: Where one indicator is present that is likely to be used by sensitive groups (i.e. children) **Low**: Indicators that are unlikely to be used by sensitive groups
Road users	Roads, junctions, road classification, baseline traffic volumes, signage	Determined by the presence of other affected parties in this table

MAGNITUDE OF EFFECTS

15.8.20. This section considers how magnitude will be considered for each of the potential effects outlined in this chapter. The guidance for thresholds of magnitude is based on DMRB guidance (Volume 11, Section 3, Part 8) (**Ref.**

15-9), DMRB guidance LA 112 (**Ref. 15-10**), WebTAG guidance (**Ref. 15-11**), and professional judgement and is presented in **Table 15-4**.

- **Severance**, in the context of this assessment, relates to driver severance and the potential difficulties of local traffic gaining access onto busy roads during the construction period. The assessment will consider both local traffic and the proportion of HGVs.
- **Pedestrian Delay** occurs when there is difficulty crossing a heavily trafficked road. Effects are only likely to be realised when the total two-way traffic on the carriageway exceeds 1,400 vehicles per hour.
- **Pedestrian Amenity** is similar to Pedestrian Delay in that there needs to be a fairly significant proportional increase in traffic for baseline effects to be considerably worsened. The IEMA guidelines suggest that traffic needs to double for effects to become significant.
- **Fear and Intimidation** occurs through a combination of traffic flow, speed, proportion of HGVs and the proximity of the above to people or receptors on highway links. These indicators are often heightened by a perceived lack of protection or buffers from the highway or through narrow or non-existent footways. The assessment will consider each link on a case by case basis, although indicative thresholds are provided in the IEMA Guidelines
- **Driver Delay** is an effect cited in the IEMA guidance and relates to incremental increases in traffic. As a further consideration, where any temporary road closures or traffic management at road crossings are required in order to enable the construction of the Proposed Development, any additional delay caused as a consequence of following diversion routes will be considered and assessed.
- **Highway safety** considers PIA data obtained for the most recent five years at junctions and links along the proposed construction traffic routes. This data will be used to assess whether the additional traffic during construction of the Proposed Development would be likely to have a detrimental effect on road safety. The assessment will use the methodology from the Department for Transport's WebTAG guidance (**Ref. 15-11**) which will be outlined in more detail in the assessment.

15.8.21. **Table 15-4** summarises the criteria that will be assessed in the ES, along with the thresholds used to determine whether the effects are considered Very Low, Low, Medium or High. Within this table, neither the sensitivity of receptors, nor the duration over which the effects are experienced, is taken into consideration.

Table 15-4: ES Magnitude Criteria – Traffic and Transport

Impact	Very Low	Low	Medium	High
Severance	Increase in total traffic flows of 29% or under (or increase in HGV flows under 10%)	Increase in total traffic flows of 30-59% (or increase in HGV flows of between 20-39%)	Increase in total traffic flows of 60-89% (or increase in HGV flows between 40-89%)	Increase in total traffic flows or HGV flows of 90% or above
Pedestrian Delay	Total traffic flows under 1,400 per hour		Where traffic flows exceed 1,400 vehicles per hour the severity of the impact will be determined on a case by case basis based on receptor sensitivity	
Pedestrian Amenity	Increase in total traffic flows of 49% or under	Increase in total traffic flows of 50-69%	Increase in total traffic flows of 70-99%	Increase in total traffic flows of 100% or above
Fear and Intimidation	Increase in total traffic flows of 29% or under (or increase in HGV flows under 10%)	Increase in total traffic flows of 30-59% (or increase in HGV flows of between 20-39%)	Increase in total traffic flows of 60-89% (or increase in HGV flows between 40-89%)	Increase in total traffic flows or HGV flows of 90% or above
Driver Delay	Increase in total traffic flows of less than 29%	Increase in total traffic flows of 30-59% (or increase in HGV flows of between 20-39%)	Increase in total traffic flows of 60-89% (or increase in HGV flows between 40-89%)	Increase in total traffic flows or HGV flows of 90% or above

Impact	Very Low	Low	Medium	High
Highway Safety	Increase in traffic flows of 30% or under (or increase in HGV flows under 10%)		All links estimated to experience increases in total traffic flows above 30% or increases in HGV flows above 10% are analysed further on a case by case basis	

Duration

15.8.22. **Table 15-4** sets out the magnitude thresholds for the respective traffic and transport effects. All effects have a magnitude that does not, initially, consider the duration over which the effect is likely to be experienced.

15.8.23. Duration is considered when assessing the overall significance of residual effects, noting that the DMRB Volume 11 Section 2 Part 5 (**Ref. 15-12**) states in para 1.47:

"Recognition should be made that permanent impacts will be more significant than those of a temporary nature. For example, the impact may only occur during a single phase of the project construction and may be temporary. Alternatively, the impact may be long-term or irreversible and hence permanent. It is, therefore, important that the assessment distinguishes between permanent and temporary impacts"

15.8.24. DMRB LA104 (**Ref. 15-13**) also states that:

"*The assessment of the significance of environmental effects shall cover the following factors:*

3) The duration (long or short term); permanence (permanent or temporary) and changes in significance (increase or decrease)"

15.8.25. All of the traffic and transport effects associated with the Proposed Development would be temporary effects. Some temporary effects would be likely to last longer than others, and these will be reported and considered in the assessment.

15.8.26. Following a quantified assessment based on changes to traffic flow/composition, residual effects will be assessed and reported taking into account professional judgment on the duration over which effects are likely to be experienced.

Significance

15.8.27. Effects are considered to be significant or not significant in EIA terms by judging the relationship between the magnitude of effect of each assessment criteria to be assessed with the sensitivity of each receptor. A Major or Moderate effect is

typically considered to be significant. A Minor or Negligible effect is not considered to be significant. The matrix used to determine the significance of effects is presented in Table 4.1, Section 4.8 of **Chapter 4: EIA Methodology** of this EIA Scoping Report.

15.9. LIMITATIONS AND ASSUMPTIONS

15.9.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified. Some of these assumptions would be adopted to add robustness to the assessment and represent a worst-case scenario. At this time the following assumptions will be used in the assessment:

- An overall link value will be applied to each link based upon the number of built environment indicators present;
- All HGV construction traffic is assumed to originate from the SRN;
- LGV movements will be distributed based on the level of existing traffic flows from entry/exit links into the Study Area;
- The assessment will consider all vehicles with a weight in excess of 3.5 tonnes as HGVs;
- All vehicle movements quoted are assumed to be two-way journeys; i.e. 40 movements would consist of 20 inbound and 20 outbound trips;
- Traffic flows will be based upon traffic surveys where possible in agreement with the respective highway authorities. However, due to the atypical traffic conditions during the Covid-19 pandemic alternative, appropriate sources will be identified and used where possible, in liaison with highways authorities; and
- The assessment will not consider operational impacts or those anticipated during decommissioning.

15.10. REFERENCES

- **Ref. 15-1** IEMA Guidelines for the Environmental Assessment of Road Traffic (1993)
- **Ref. 15-2** Flintshire County Council GIS https://fccmapping.flintshire.gov.uk/connect/analyst/mobile/#/main [Last accessed 14th April 2021]
- **Ref. 15-3** Cheshire West and Chester Council GIS [Last accessed 14th April 2021]
- **Ref. 15-4** Sustrans National Cycle Network Map https://www.sustrans.org.uk/national-cycle-network [Last accessed 14th April 2021]

- **Ref. 15-5** North and Mid Wales Trunk Road Agent Website https://traffic.wales/north-and-mid-wales -trunk-road-agent-nmwtra [Last accessed 14th April 2021]
- **Ref. 15-6** Highways England Website https://highwaysengland.co.uk/ [Last accessed 14th April 2021]
- **Ref. 15-7** MCHLG Guidance on Travel Plans, Transport Assessments, and Statements (2014) https://www.gov.uk/guidance/travel-plans-transport-assessments-and-statements [Last accessed 14th April 2021]
- **Ref. 15-8** Design Manual for Roads and Bridges Volume 11, Section 3, Part 8 https://www.standardsforhighways.co.uk/prod/attachments/617ebdbc-fb3a-47bd-8f99-39046c50e252?inline=true [Last accessed 14th April 2021]
- **Ref. 15-9** Design Manual for Roads and Bridges LA 112 https://www.standardsforhighways.co.uk/dmrb/search/1e13d6ac-755e-4d60-9735-f976bf64580a
- **Ref. 15-10** DfT WebTAG Guidance Homepage https://www.gov.uk/guidance/transport-analysis-guidance-tag [Last accessed 14th April 2021]
- **Ref. 15-11** DfT "TAG UNIT A4.1 Social Impact Appraisal" (2020) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/940958/tag-a4-1-social-impact-appraisal.pdf [Last accessed 14th April 2021]
- **Ref. 15-12** Design Manual for Roads and Bridges Volume 11, Section 2, Part 5 https://www.standardsforhighways.co.uk/prod/attachments/0f6e0b6a-d08e-4673-8691-cab564d4a60a?inline=true [Last accessed 14th April 2021]
- **Ref. 15-13** Design Manual for Roads and Bridges LA104: Environmental assessment and monitoring Rev 1 (2019) https://www.standardsforhighways.co.uk/prod/attachments/0f6e0b6a-d08e-4673-8691-cab564d4a60a?inline=true [Last accessed 14th April 2021]

16. WATER RESOURCES AND FLOOD RISK

16.1. INTRODUCTION

16.1.1. This Chapter considers the impact of the Proposed Development on water resources and flood risk. It sets out the proposed methodology for the water resources and flood risk assessment and identifies those impacts that can be scoped out of the Environmental Impact Assessment (EIA). It considers all possible receptors within the Study Area including main rivers, ordinary watercourses, other surface waterbodies such as lakes, groundwater water bodies, Source Protection Zones (SPZ), groundwater and surface water discharges and abstractions, the floodplain and people and properties at risk of flooding now and/or in the future.

16.2. STUDY AREA

16.2.1. The Study Area for each assessment of effects is described below.

SURFACE WATER QUALITY, HYDROLOGY AND HYDROMORPHOLOGY

16.2.2. The Study Area for assessing impacts to water quality and hydrological and hydromorphological processes is defined as within 500m of the Newbuild Infrastructure Scoping Boundary. The Study Area also includes any surface water features or water dependent conservation sites (surface water and groundwater) located up to 5km downstream of the Newbuild Infrastructure Scoping Boundary which are directly hydrologically connected to the Proposed Development.

HYDROGEOLOGY

16.2.3. The Study Area for assessing the hydrogeology impacts is defined as the Newbuild Infrastructure Scoping Boundary plus a 1km buffer. This distance is considered appropriate at this stage for the assessment of direct effects on hydrogeology (i.e. water abstractions, groundwater flow and levels and groundwater quality). Note, the buffer zone may be increased in subsequent assessment stages (as more information e.g. regarding sensitive receptors and local conditions becomes available).

FLOOD RISK

16.2.4. The Study Area is all land and property with the potential to experience a change in flood risk as a result of the Proposed Development. As a starting point it will be assumed that this would be land and property located within 500m of the Newbuild Infrastructure Scoping Boundary, in the location of watercourses, floodplains and significant surface water flow routes. However, the relevant extent will be modified as appropriate based on the professional

judgement of the assessor, as flood risk influence area cannot be defined only based on distance.

WATER FRAMEWORK DIRECTIVE

16.2.5. The study area for the Water Framework Directive (WFD) assessment will include the WFD water bodies in which the Proposed Development is located as well as any other water bodies which are likely to be affected, such as water bodies immediately downstream of the Proposed Development.

16.3. BASELINE CONDITIONS

16.3.1. The following baseline information has been collated from the following sources:

- Environment Agency's online Flood Map for Planning (**Ref. 16-1**);
- Environment Agency's online Flood Risk from Surface Water map (**Ref. 16-2**);
- Environment Agency's online Flood Risk from Reservoirs map (**Ref. 16-3**);
- Environment Agency's Recorded Flood Outlines map (**Ref. 16-4**);
- Environment Agency's online Catchment Data Explorer (**Ref. 16-5**);
- Environment Agency's North West River Basin Management Plan (**Ref. 16-6**);
- Natural Resources Wales' Dee River Basin Management Plan (**Ref. 16-7**);
- Natural Resources Wales' Water Watch Wales (**Ref. 16-8**);
- Natural Resources Wales' NBN Atlas Wales (**Ref. 16-9**);
- Natural Resources Wales' Flood Risk Map Viewer (**Ref. 16-10**);
- Ordnance Survey Mapping (**Ref. 16-11**);
- Environment Agency LiDAR Digital Terrain Model (**Ref. 16-12**);
- DEFRA 'Magic Map' online GIS portal (**Ref. 16-13**);
- British Geological Survey (BGS) Geology of Britain Viewer (**Ref. 16-14**);
- BGS Geoindex online database (**Ref. 16-15**);
- Google maps, Aerial Imagery (**Ref. 16-16**);
- National Library of Scotland, Historical mapping (**Ref. 16-17**);
- Flood Estimation Handbook Web Service (**Ref. 16-18**);
- Cheshire West and Cheshire Council Strategic Flood Risk Assessment (**Ref. 16-19**);
- Flintshire's Preliminary Flood Risk Assessment (**Ref. 16-20**).

SURFACE WATER

16.3.2. There are potentially eleven Main Rivers that will be crossed by the Proposed Development; namely, Elton Green Brook, River Gowy and three of its

tributaries near Thornton le Moors, Mill Brook, Backford Brook, Border Drain, Dee Estuary, Beeches Brook and Sandycroft Drain. The Proposed Development will also cross the Shropshire Union Canal.

16.3.3. In addition, there are potentially 21 ordinary watercourses crossed by the Proposed Development, including Finchetts Drain, New Inn Brook, Alltami Brook, Wepre Brook, Northop Brook and Pentre Brook. There are several other ordinary watercourses located within 500m of the Newbuild Infrastructure Scoping Boundary.

16.3.4. There are a number of ponds located within the Newbuild Infrastructure Scoping Boundary and within 500m of the Newbuild Infrastructure Scoping Boundary.

16.3.5. The Dee Estuary Special Protection Area and Mersey Estuary Site of Special Scientific Interest are located within 5km directly downstream of watercourses crossed by the Proposed Development.

16.3.6. There are 12 licensed discharges to controlled surface waters within 500m of the Newbuild Infrastructure Scoping Boundary, within England, all of which are discharges of treated effluent from private properties or sewer storm overflows owned by water companies.

16.3.7. There are four licenced surface water abstractions within 5km downstream of the Newbuild Infrastructure Scoping Boundary, in England, which are presented in **Table 16-1**. Location of surface water abstractions in Wales is currently not known.

Table 16-1: Licenced surface water abstractions downstream of the Proposed Development

Licence number	Water body	Description	Maximum annual quantity (litres)
2568006091	Shropshire Union Canal	Industrial, commercial or public services	27,270
2568006113	River Gowy	Industrial, commercial or public services – refuse and recycling	2,186,670
NW/068/0006/016	Thornton Brook	Industrial, commercial or public services – hydraulic testing	41,500
NW/068/0006/004	River Gowy	Environmental improvements	No amount published.

HYDROGEOLOGY

16.3.8. Baseline conditions have been informed using publicly available information listed in paragraph 16.3.1. Further information will be gathered within a Phase I Preliminary Desk Study which will include a Groundsure Report and a site visit to inspect the Study Area. In addition to the desk study, intrusive ground investigation will provide site specific data on groundwater conditions.

16.3.9. Publicly available information indicates that the Study Area is underlain by superficial deposits comprising (from east to west direction along the route of the Proposed Development) peat, glacial till, alluvial fan deposits (sand and gravels), tidal flat deposits (clay, silt and sand), and alluvium (clay, silt, sand and gravels).

16.3.10. The underlying bedrock is comprised mainly of Permo-Triassic Sandstone in the east and Coal Measures in the west. Specifically formations from east to west (at outcrop) along the route of the Proposed Development are the Chester Formation (pebbly sandstone), Wilmslow Sandstone Formation (sandstone with sporadic siltstones), Kinnerton Sandstone Formation (sandstone), Etruria Formation (mudstone, sandstone and conglomerate), Pennine Lower Coal Measures (mudstone, siltstone, sandstone with common coal seams), Bowland Shale Formation (fissile and blocky mudstone with interbedded limestones and sandstones), Gwespyr Sandstone Formation (sandstone with intercalated siltstone and mudstone), Loggerheads Limestone Formation (thickly bedded limestones) and Cefn Mawr Limestone Formation (thinly interbedded limestones and mudstones).

16.3.11. The Block Valve Stations (BVS), on the existing natural gas Flint-PoA pipeline, are specifically located within the following deposits:

- Coed-y-Cra: glacial till over the Gwespyr Sandstone Formation
- Cornist Lane: directly over the Bowland Shale Formation
- Pentre Halkiyn: glacial till and Loggerheads Limestone Formation
- Babell: glaciofluvial deposits over the Cefn Mawr Limestone Formation

16.3.12. BGS maps indicate that series of north south trending normal faults cut into the bedrock along the Proposed Development.

16.3.13. Superficial deposits are classified by the EA as Secondary A and Secondary Undifferentiated aquifers. Bedrock deposits are in turn classified as Principal aquifers (Chester and Kinnerton Formations at the eastern side of the Study Area) and Secondary A aquifers (remaining western part of the Study Area including Pennine Coal Measures, Etruria Formation, Gwespyr Sandstone Formation).

16.3.14. A groundwater Source Protection Zone (SPZ) Total Catchment Zone 3 is located approximately 750m from the Newbuild Infrastructure Scoping

Boundary, east of Chester and south of the River Dee. No other SPZs are present within 1km of the Newbuild Infrastructure Scoping Boundary.

16.3.15. Groundwater abstraction information has been gathered from the Environment Agency Water Abstraction Licences Map (**Ref. 16-21**). This information is limited to the section of the Proposed Development located within England. According to the mapping, several groundwater abstractions are located within the 1km of the Newbuild Infrastructure Scoping Boundary and are all for industrial and agricultural uses. However, no information is still available on the presence of groundwater abstractions within the section of the Proposed Development located within Wales.

16.3.16. According to the BGS hydrogeological maps, groundwater within the Permo-Triassic aquifers is expected to be between 0m AOD close to the sea/estuaries and at the north eastern area of the Proposed Development and approximately 10m AOD further away from the estuaries/sea.

FLOOD RISK

16.3.17. In England, the Proposed Development crosses Flood Zone 2 at five locations: the floodplains associated with Gale Brook, Thornton Brook East, River Gowy and tributaries, and the Dee Estuary. Flood Zone 2 is land assessed as having between 0.1% and 1% chance of flooding any given year from rivers, or between 0.1% and 0.5% chance of flooding any given year from the sea.

16.3.18. In Wales, the Proposed Development crosses Zone C2 (Areas of floodplain not benefitting from flood defences) in three locations: the Dee Estuary, Alltami Brook and Wepre Brook. There is land either side of the Dee Estuary which is located within Zone C1 (Areas of floodplain which are developed and benefitting from flood defences). The floodplains of the Dee Estuary and River Gowy, as well as land east of Elton, are at risk of coastal/tidal flooding.

16.3.19. The four BVS on the existing natural gas Flint-PoA pipeline are all located within areas of land with a 0.1% (or less) chance of flooding each year from rivers or the sea. Their locations are within Zone A which is considered to be at little or no risk of fluvial or tidal/coastal flooding. The BVS at Coed-y-Cra, Cornist Lane and Pentre Halkyn are located within areas of very low risk of fluvial flooding, however they are located within 500m of high risk areas. These areas are floodplains associated with the Afon Nant-y-Flint and Afon Pant-Gwyn.

16.3.20. The recorded flood outline shows that the following areas have previously flooded from fluvial or coastal sources:

- Rural land west of Thornton le Moors (April 1971);
- Knolls Bridge, Chester (January 1964);
- Part of Deeside Industrial Estate (Date not published);
- Land south east of Garden City (Date not published);

- Land between Sandycroft and A5104 Chester Road (Date not published); and
- Land at Ewloe Green (Date not published)

16.3.21. Land adjacent to the Dee Estuary and within the Newbuild Infrastructure Scoping Boundary is classed as an area benefitting from flood defences for flooding from the sea. These defences run along the edge of the Dee Estuary, Finchetts Drain, Border Drain and Sandycroft drain (upstream of Chester Road). There is also an area of Hawarden Airport which benefits from fluvial flood defences as well, likely associated with the Sandycroft Drain.

16.3.22. There are also flood defences along the Mill Brook, River Gowy and its tributaries, and Gale Brook. These defences comprise of either high ground or embankments along the watercourses. As a result, the Essar Stanlow Refinery site is defined as an area benefitting from these defences.

16.3.23. There are a few areas of surface water flooding, mostly associated with ordinary watercourses or overland flow routes. Notable locations include:

- Land east of Pool Lane, Stanlow Oil Refinery;
- Land adjacent to Gale Brook;
- Land adjacent to Thornton Brook East;
- Land adjacent to the River Gowy and its tributaries;
- Land adjacent to the Shropshire Union Canal, Wervin;
- Chorlton Lane;
- Collinge Wood;
- South of Station Road, Lea by Backford;
- Land adjacent to Grove Road, Lea by Backford;
- Land east of Parkgate Road, Mollington; and
- Land south west of Chester Road, Sandycroft.

16.3.24. The BVS are at very low risk of surface water flooding (areas of land with 0.1% (of less) chance of flooding each year from surface water).

16.3.25. The Cheshire Strategic Flood Assessment (**Ref. 16-19**) indicates that few areas within the Proposed Development are susceptible of groundwater flooding. These areas are mainly located within the eastern section of the Proposed Development (Grinsome Road Above Ground Installation (AGI) and Alcohols Site AGI) and in proximity of the River Dee. No information is available on groundwater flooding risks within Wales.

WATER FRAMEWORK DIRECTIVE

16.3.26. All water bodies either crossed by the Proposed Development or immediately downstream of the Proposed Development are presented in **Table 16-2** and **Table 16-3**, along with their current WFD status. The waterbodies presented in both tables are ordered from east to west along the Proposed Development.

Table 16-2: WFD Water Bodies Crossed by, or Immediately Downstream, of the Proposed Development

WFD water body name	WFD water body ID	Water body type	Connection with Proposed Development	Overall Status	Ecological Status	Chemical Status
Peckmill Brook, Hoolpool Gutter and Ince Marshes	GB112068060330	River	This water body is not crossed by the Proposed Development. Eastern extent of Proposed Development lies within the catchment boundary of this water body.	Moderate	Moderate	Fail
Gowy (Milton Brook to Mersey)	GB112068060250	River (Heavily Modified Water Body (HMWB))	Crossed by the Proposed Development. Downstream water body of Stanney Mill Brook water body, which is also crossed by the Proposed Development.	Moderate	Moderate	Fail
Stanney Mill Brook	GB112068060260	River (HMWB)	Crossed by the Proposed Development.	Moderate	Moderate	Fail
Mersey	GB531206908100	Transitional (HMWB)	This water body is not crossed by the Proposed Development. Downstream water body of Gowy (Milton Brook to Mersey) which is crossed by the Proposed Development.	Moderate	Moderate	Fail
Shropshire Union Canal, Market Drayton to Ellesmere Port	GB71210133	Artificial	Crossed by the Proposed Development.	Moderate	Moderate	Fail
Manchester Ship Canal	GB71210004	Artificial	This water body is not crossed by the Proposed Development. Downstream of Shropshire Union Canal which is crossed by the Proposed Development.	Moderate	Moderate	Fail
Finchetts Gutter	GB111067056930	River (HMWB)	Crossed by the Proposed Development.	Poor	Poor	Fail
Garden City Drain	GB111067056960	River (HMWB)	Crossed by the Proposed Development.	Moderate	Moderate	Fail
Dee (N.Wales)	GB531106708200	Transitional	Crossed by the Proposed Development.	Moderate	Moderate	Fail
Sandycroft Drain	GB111067052160	River	Crossed by the Proposed Development.	Moderate	Moderate	Good
Wepre Brook	GB111067056880	River	Crossed by the Proposed Development.	Moderate	Moderate	Good
Swinchiard Brook	GB111067056940	River	The Cornist and Coed-y-Cra BVS are located within this water body.	Good	Good	Good
Pant Gwyn	GB110066059940	River	The Pentre Halkyn BVS is located within this water body.	Good	Good	Good
Wheeler – lower	GB110066059930	River	The Babell BVS is located within this water body.	Good	Good	Good

Table 16-3: WFD Groundwater Bodies Crossed by, or Immediately Downstream, of the Proposed Development

WFD water body name	WFD water body ID	Water body type	Connection with Proposed Development	Overall Status	Quantitative Status	Chemical Status
Wirral and West Cheshire Permo-Triassic Sandstone Aquifers	GB41101G202600	Groundwater	Crossed by the Proposed Development.	Poor	Good	Poor
Dee Permo-Triassic Sandstone	GB41101G202400	Groundwater	Crossed by the Proposed Development.	Poor	Good	Poor
Dee Carboniferous Coal Measures	GB41102G204800	Groundwater	Crossed by the Proposed Development. Cornist and Coed-y-Cra BVS are located within this water body.	Poor	Good	Poor
Clwyd Carboniferous Limestone	GB41001G200300	Groundwater	Babell and Pentre Halkyn BVS are located within this water body.	Good	Good	Good

16.4. DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION PHASE

16.4.1. A Register of Commitments will be presented as part of the ES. In addition, the draft Order will include a requirement for a Construction Environmental Management Plan (CEMP). The controls and measures within the CEMP will be implemented to mitigate against impacts during the construction phase.

16.4.2. The following design and mitigation measures will be considered as part of the Water Resources and Flood Risk assessment.

Surface Water and Water Framework Directive

16.4.3. Major surface water crossings will be trenchless crossings to avoid disruption to hydrological processes and riparian and aquatic habitats.

16.4.4. Minor watercourses may be crossed via trenched crossings. In such occurrences, the hydrological regime will be maintained through temporary diversion or pumping. A sediment management plan and the provision of adequate buffer zones and silt fencing between construction activities and the watercourses will control sediments and pollutants reaching watercourses

Hydrogeology

16.4.5. Given the extensive areas of proposed trenching, directional drilling and tunnelling, as well as the potential shallow depths to groundwater encountered, groundwater interceptions are considered likely. A groundwater management plan will be developed as part of a CEMP to ensure all groundwaters abstracted through construction are appropriately managed.

16.4.6. To ensure minimal loss of groundwater quantity from the water environment, water recycling practices, including re-use of hydrotest water, should be considered.

16.4.7. Sustainable drainage systems (SUDS) requirements for the AGIs will be followed to mitigate reduced groundwater recharge.

Flood Risk

16.4.8. Where possible, storage of materials or site compounds will not be located within the active fluvial and tidal floodplain. Construction material will be controlled near watercourses. At trenched crossings of watercourses, there will be a control of flows to avoid an increase of flood risk. There will be temporary drainage solutions to control runoff and protect surface water drainage patterns. Potential groundwater flooding in excavations will be controlled. Emergency planning procedures for construction workers will be implemented in case of risk of flooding, as appropriate.

OPERATION PHASE

Surface Water and Water Framework Directive

16.4.9. Mitigation will be implemented where deemed necessary through the assessment process. It may be required for the carbon dioxide pipeline to be protected or relocated to avoid areas where channel incision or lateral migration is likely. The design of the Proposed Development will evolve to mitigate these potential impacts.

Hydrogeology

16.4.10. SUDS will be implemented within the AGI areas. In addition, clay plugs will be also placed to avoid preferential groundwater pathways along the carbon dioxide pipeline routes.

Flood Risk

16.4.11. The design of the Proposed Development will avoid loss of floodplain storage capacity in active fluvial floodplains (if applicable). There will be control of runoff from AGIs and BVS via appropriate drainage strategies. Flood risk at AGIs and BVS will be managed for operation and maintenance, through design such as raising finished flood levels, and appropriate procedures e.g. development of suitable emergency procedures.

16.5. DESCRIPTION OF LIKELY SIGNIFICANT EFFECTS

SURFACE WATER QUALITY, HYDROLOGY AND HYDROMORPHOLOGY

16.5.1. The potential impacts which may result in a significant effect and are therefore scoped into the ES are as follows:

Construction Phase

- Impact to water quality and hydromorphology by entrainment of materials, particularly associated with loose sediment either exposed through excavation or stockpiled on site;
- Impact to water quality by spillage of pollutants, particularly associated with poor management of harmful chemicals and maintenance of construction plant;
- Temporary blockage of smaller watercourses which would not be subject to trenchless crossings; and

Operation Phase

- Impact to water quality from formal surface water drainage from the AGIs.

16.5.2. The BVS are small scale and therefore are not expected to pose any significant potential effects to water quality, hydrology or hydromorphology.

16.5.3. Due to the nature of the proposals, it is not expected that the Proposed Development will have a significant impact on public water supply as demand will be limited and therefore it is proposed to scope this out. The carbon dioxide pipeline is a sealed, below-ground feature and therefore there are no potential impacts anticipated for surface water bodies from the carbon dioxide pipeline during the operation phase.

HYDROGEOLOGY

16.5.4. The potential impacts which may result in a significant effect and are therefore scoped into the ES are as follows:

Construction Phase

- Increased pollution risks from spillage of fuels or other harmful substances that may migrate to local surface water and groundwater receptors and aquifers;
- Increased pollution risks from construction materials storage that may migrate to local surface water and groundwater receptors and aquifers;
- Increased pollution risk as a result of increased turbidity of runoff water due to construction processes (earthworks) which may infiltrate into the underlying aquifer;
- Direct quantitative impact or changes to groundwater aquifers and groundwater supported public and private water supplies, either within the footprint of the Proposed Development or as a result of changes to groundwater flows and levels associated with the dewatering of trenches and deep excavations or piling into the aquifer;

Operation Phase

- Impact on groundwater quality from spillages related to the Proposed Development (i.e. block valves, mechanical infrastructure, electrical stations); and
- Permanent impacts to groundwater aquifers and groundwater supported public and private water supplies, either within the footprint of the Proposed Development or as a result of changes to groundwater flows and levels associated with barrier effects caused by deep structures, especially within areas already at risk of flooding.

FLOOD RISK

16.5.5. Due to the nature of the proposals and the limited above ground infrastructure, it is not expected that the Proposed Development will significantly impact on the potential sources of flooding along the route and associated flood risk to people. However, potential impacts which may result in a significant effect (i.e. flood risk to people) and must be investigated are as follows:

Construction Phase

- Storage or materials and equipment within area of flood risk may impact on surface water drainage patterns, floodplain storage capacity and increase flood risk in the surrounding area;
- Temporary blockages of watercourses for trenched crossings may modify/increase conveyance increasing flood risk in the surrounding areas;
- Site works might affect local topography and permeability increasing runoff and surface water flood risk;
- Works within the floodplain or areas at risk of flooding might put construction workers at risk in the floodplain or areas at risk of flooding;

Operation Phase

- Possible loss of floodplain storage capacity at location of AGI structures, primarily at Grinsome Road AGI, might increase flood risk elsewhere; and
- Operators might be at risk if working within the floodplain or areas at risk of flooding. This is applicable especially for AGIs or BVS located within the floodplain, namely at Grinsome Road and Alcohols Site AGI.

16.5.6. Surface water runoff from the increased impermeable surface at the location of the BVS and the AGIs would be controlled via the drainage strategy. The BVS for the existing Flint-PoA pipeline are all located outside of the floodplain and away from surface water flow routes. Therefore, there is no significant increase to flood risk for operators, maintainers or nearby residents during the operation phase associated with these BVS.

WATER FRAMEWORK DIRECTIVE

16.5.7. The Proposed Development has the potential to impact hydrological and hydromorphological processes and chemical quality within WFD water bodies, primarily during the construction phase. Impacts to these elements have a subsequent effect on aquatic habitats.

16.5.8. If there is significant impact to WFD quality elements, the Proposed Development could cause either degradation of the WFD water body status / potential or prevent the water body from achieving Good status / potential. Both the construction and operation phases would be assessed. Although impacts to WFD are more often associated with the operation phase of projects, there is potential for construction effects, if not mitigated, to adversely impact WFD status, if the effects are large enough to cause a long-term effect on the water body. In addition, where the construction period extends beyond typically six months, the regulators typically request that potential construction impacts are considered permanent within the WFD assessment.

ELEMENTS SCOPED IN OR OUT OF FURTHER ASSESSMENT

16.5.9. The impacts scoped in or out for the Water Environment assessment are as follows:

Table 16-4: Elements Scoped In or Out of Further Assessment

Element	Phase	Scoped In	Scoped Out	Justification
Water and flooding impacts arising from Existing Pipeline Works (excluding BVS)	Construction Operation		✔	No physical works consented within this Application. Therefore, no impact pathways relevant to water and flooding.
Surface Water receptors				
Main Rivers crossed by the Proposed Development	Construction and Operation	✔		Potential for direct physical impacts based on route alignment.
Ordinary watercourses crossed by the Proposed Development	Construction and Operation	✔		Potential for direct physical impacts based on route alignment.
Ordinary watercourses downstream or downslope of the Proposed Development	Construction and Operation	✔		Potential for indirect physical impacts based on route alignment.
Ordinary watercourses upstream or upslope of the Proposed Development	Construction and Operation		✔	The Proposed Development will not directly or indirectly affect these water bodies.
Ponds / lakes downslope of the Proposed Development	Construction and Operation	✔		Potential for indirect physical impacts based on route alignment.
Ponds / lakes upslope of the Proposed Development	Construction and Operation		✔	The Proposed Development will not directly or indirectly affect these water bodies.
Public water drainage networks receiving runoff from the Proposed Development	Construction and Operation	✔		Potential for indirect physical impacts based on proposed site drainage
Dee Estuary Special Protection Area and Mersey Estuary Site of Special Scientific Interest	Construction and Operation	✔		Potential for indirect physical impacts based on route alignment.
Impact to public water supply	Construction and Operation		✔	The Proposed Development is not anticipated to cause this effect.
Groundwater receptors				
Groundwater quality- Principal and Secondary A aquifers	Construction and Operation	✔		During construction - pollution risk from spillages, material storage and increase turbidity. During construction and operation connectivity between different water bearing units may be created (e.g. various layers within the Coal Measures or in areas with elevated groundwater salinity). During operation there is potential for spillages from AGIs.

Element	Phase	Scoped In	Scoped Out	Justification
Impacts to groundwater flows - Principal and Secondary A aquifers	Construction and Operation	✔		Temporary dewatering during construction and long-term underground structures and reinstated ground have the potential to affect the groundwater levels and flows.
Impacts to groundwater associated users (including as a result of changes to groundwater flows and levels)	Construction	✔		Any dewatering which may be required may have the potential to impact on nearby groundwater abstractions.
Flood Risk receptors				
Residents and users of the surrounding land	Construction and Operation	✔		Potential for increase to flood risk elsewhere as a result of the Proposed Development within the floodplain. Below ground structures (pipeline/ piles/foundations) have the potential to create a groundwater flow barrier resulting in groundwater level rise and potentially increasing the risk of groundwater flooding.
Construction workers	Construction	✔		Potential risk to construction workers due to works within the floodplain and near watercourses. Below ground structures (pipeline/ piles/foundations) have the potential to create a groundwater flow barrier resulting in groundwater level rise and potentially increasing the risk of groundwater flooding.
Development operators/maintainers	Operation	✔		Potential risk to operators/maintainers due to Proposed Development within the floodplain. Below ground structures (pipeline/ piles/foundations) have the potential to create a groundwater flow barrier resulting in groundwater level rise and potentially increasing the risk of groundwater flooding.
WFD receptors				
River water bodies				
Peckmill Brook, Hoolpoo and Ince Marshes GB112068060330	Construction and Operation	✔		Potential for direct physical impacts based on route alignment.
Gowy (Milton Brook to Mersey) GB112068060250	Construction and Operation	✔		Potential for direct physical impacts based on route alignment.
Stanney Mill Brook GB112068060260	Construction and Operation	✔		Potential for direct physical impacts based on route alignment.

Element	Phase	Scoped In	Scoped Out	Justification
Finchetts Gutter **GB111067056930**	Construction and Operation	✔		Potential for direct physical impacts based on route alignment.
Garden City Drain **GB111067056960**	Construction and Operation	✔		Potential for direct physical impacts based on route alignment.
Sandycroft Drain **GB111067052160**	Construction and Operation	✔		Potential for direct physical impacts based on route alignment.
Wepre Brook **GB111067056880**	Construction and Operation	✔		Potential for direct physical impacts based on route alignment.
Artificial water bodies				
Shropshire Union Canal, Market Drayton to Ellesmere Port **GB71210133**	Construction and Operation	✔		Potential for direct physical impacts based on route alignment.
Manchester Ship Canal **GB71210004**	Construction and Operation		✔	Sufficiently downstream of Proposed Development for potential indirect impacts to be insignificant.
Transitional water bodies				
Dee (N. Wales) **GB531106708200**	Construction and Operation	✔		Potential for direct physical impacts based on route alignment.
Mersey **GB531206908100**	Construction and Operation	✔		Potential for indirect physical impacts based on route alignment.
Groundwater water bodies				
Wirral and West Cheshire Permo-Triassic Sandstone Aquifers **GB41101G202600**	Construction and Operation	✔		Potential indirect and direct impacts to groundwater quality and quantity based on route alignment.
Dee Permo-Triassic Sandstone **GB41101G202400**	Construction and Operation	✔		Potential indirect and direct impacts to groundwater quality and quantity based on route alignment.
Dee Carboniferous Coal Measures **GB41102G204800**	Construction and Operation	✔		Potential indirect and direct impacts to groundwater quality and quantity based on route alignment.

16.6. OPPORTUNITIES FOR ENHANCING THE ENVIRONMENT

16.6.1. There are currently no known enhancements for the surface water or groundwater environment proposed as part of the Proposed Development. However, opportunities to enhance the water environment may become apparent at a later stage.

16.7. PROPOSED ASSESSMENT METHODOLOGY

LEGISLATION, POLICY AND GUIDANCE

16.7.1. The following legislation, policy and guidance will underpin the assessment and will be described in detail in the ES.

Legislative Framework

- Environment Act (1995) (**Ref. 16-22**);
- The Water Resources Act (1991) (**Ref. 16-23**);
- The Water Act 2003(**Ref. 16-24**);
- The Water Act 2014 (**Ref. 16-25**);
- Land Drainage Act (1991) (**Ref. 16-26**);
- Flood Risk Regulations (2009) (**Ref. 16-27**);
- Groundwater (England and Wales) Regulations (2009) (**Ref. 16-28**);
- Flood and Water Management Act (2010) (**Ref. 16-29**);
- Environmental Permitting (England and Wales) Regulations (2010) (**Ref. 16-30**);
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (**Ref. 16-31**);
- The Groundwater (Water Framework Directive) (England) Direction 2016 (**Ref. 16-32**) ; and
- The Groundwater (Water Framework Directive) (Wales) Direction 2016 (**Ref. 16-33**).

Policy

- National Policy Statement for Energy (EN-1) (**Ref. 16-34**)
- National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (**Ref.16.35**)
- National Planning Policy Framework (2012) (**Ref. 16-36**) and associated Planning Practice Guidance (**Ref. 16-37**);
- Planning Policy Wales (2021) (**Ref. 16-38**);
- The Infrastructure Planning (EIA) Regulations 2017 (**Ref. 16-39**);

Guidance

- Non-Statutory Technical Standards for Sustainable Drainage Systems (2015) (**Ref. 16-40**);
- Environment Agency Approach to Groundwater Protection (2018) (**Ref. 16-41**);
- Technical Advice Note (TAN) 15: Development and Flood Risk (**Ref. 16-42**); and
- Design Manual for Roads and Bridges (LA113) (**Ref. 16-43**).

16.7.2. The ES would be compliant with the National Policy Statement for Energy (EN-1) and Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4). The ES will provide a sufficiently detailed description of the baseline data for water quality, abstractions and discharges, and physical characteristics of the water environment. There will be assessment of both the construction and operation phase of the Proposed Development, which includes assessment of impacts associated with any new discharges and physical modifications to surface water and groundwater bodies. In particular there will be focus on impacts to water quality, resource, hydromorphology, WFD status, SPZs and potable groundwater abstractions. Impacts to aquatic ecology will be covered in the ecology chapter and the WFD assessment, where relevant.

16.7.3. A Flood Risk Assessment and Flood Consequences Assessment will be completed for the Proposed Development which are in line with the National Planning Policy Framework (England) and TAN15 (Wales), respectively, and is therefore compliant with the requirements of EN-1.

16.7.4. All relevant legislation and policies, and how they have been addressed within the EIA will be presented in the ES.

SITE SURVEY

16.7.5. A site walkover will be completed across most of the Study Area where safe access is possible. This will inform all aspects of the assessment detailed in subsequent sections below.

SURFACE WATER QUALITY, HYDROLOGY AND HYDROMORPHOLOGY

16.7.6. Impacts to water quality, hydrology and hydromorphology will be assessed qualitatively for both the construction and the operation phase of the Proposed Development. Assessing the effects of the construction phase considers risks to the chemical and physico-chemical quality of surface water receptors associated with pollutants typically encountered during construction. The assessment of effects also considers risks to hydromorphological quality associated with changes to flow dynamics and changes to sediment load, transport, deposition and erosion.

16.7.7. The assessment of potential impacts to the hydromorphological and hydrological regime of surface water features is a qualitative assessment informed by desk-based study, consultation with the project aquatic ecologist and consultation with the relevant authorities. The assessment considers the impact of the Proposed Development on catchment hydrology and flow dynamics in receiving watercourses.

HYDROGEOLOGY

16.7.8. The assessment of impacts on the water environment will follow the guidance provided in the DMRB LA 113 (**Ref. 16-43**).

16.7.9. The desk study and site visit will confirm the potential receptors for the Proposed Development. Ground investigation detail together with preliminary design details for trenching, tunnelling and other below ground works will be used to assess the impacts on the groundwater conditions within the Study Area.

16.7.10. An assessment of the potential impacts of the Proposed Development on groundwater quality and quantity will be undertaken with respect to identified groundwater abstractions including licenced activities and private water supplies, and other groundwater dependent receptors.

FLOOD RISK

16.7.11. Due to the nature of the proposals and the limited above ground infrastructure, it is not expected that flood risk will be a significant constraint to the Proposed Development.

16.7.12. Changes in flood risk during the construction and operation phases will be assessed qualitatively based on professional judgement and any necessary mitigation proposed. The assessment will also consider, from a strategic perspective, any anticipated temporary drainage solutions which will be implemented during the construction phase of the Proposed Development.

16.7.13. A standalone Flood Risk Assessment (FRA) and Flood Consequence Assessment (FCA) will be prepared to support the ES in accordance with the National Planning Policy Framework (NPPF) (**Ref. 16-36**) and Planning Policy Wales (PPW) (**Ref. 16-38**). The FRA and FCA will investigate all potential sources of flooding taking into account the expected effect of climate change and assess the potential implications of the Proposed Development on flood risk to people and property, as well as assess the potential risk of flooding to the Proposed Development. The FRA and FCA will be informed by flood mapping produced by the Environment Agency and Natural Resources Wales – no quantitative hydraulic modelling will be carried out to inform the FRA and FCA unless needed to assess site specific flood risk issues. The FRA and FCA will be informed by consultation with key stakeholders (EA, NRW, Cheshire and

Flintshire Councils as Lead Local Flood Authority). A site visit will also be carried out at areas where there is likely to be a potential impact to floodplains or flood risk.

16.7.14. A surface water drainage strategy will be developed for key AGIs to demonstrate the appropriate management of surface water runoff and the avoidance of any associated increase in flood risk taking into account the capacity of the public drainage network as appropriate.

WATER FRAMEWORK DIRECTIVE

16.7.15. The impacts to the identified WFD water bodies will be assessed through a WFD assessment. This assessment will include a screening stage which considers which water bodies should be assessed for impact, as well as which separate activities of the Proposed Development will likely cause impact to the screened in WFD water bodies.

16.7.16. Next a scoping exercise will consider which WFD quality elements will need to be scoped in for detailed assessment based on the potential impacts stemming from each scoped-in activity of the Proposed Development. The results of this screening and scoping exercise will be agreed with the Environment Agency and Natural Resources Wales prior to full assessment.

16.7.17. The potential impacts to scoped-in quality elements will then be assessed. Assessment will be qualitative and based on assessments which inform the Water Resources and Flood Risk chapter of the ES. The assessment will also identify whether any mitigation will be required in order for the Proposed Development to not cause significant impact to the WFD status of the identified water bodies.

ASSESSMENT OF EFFECTS

16.7.18. The assessment methodology used in this chapter builds on and adapts the classification contained in LA 113 Road Drainage and the Water Environment (**Ref. 16-43**) and the TAG Unit A3 Environmental Impact Appraisal – Impacts on the Water Environment.

16.7.19. The above guidance was developed for assessing potential impacts that road projects may have on the water environment; however, provides a suitable framework and basis to develop a consistent classification of both magnitude of impact and sensitivity of potential water receptors and is generally considered as industry best practice.

16.7.20. This method will not be applied for the WFD assessment as it has a specific assessment methodology as described above.

Determining Sensitivity of Receptors

16.7.21. The criteria used to determine the sensitivity of each receptor is presented in **Table 16-5.** Please note that for flood risk no 'Very High' category is proposed.

Table 16-5: Criteria for Determining Sensitivity of Receptors

Sensitivity of Receptor	Definition of Magnitude	Typical Examples
Very High	Nationally significant attribute of high importance	Watercourse having a WFD classification shown in a RBMP and with Q95 > 1m3/s. Site protected / designated under EU or UK habitat legislation (SAC, SPA, SSSI, Ramsar site, salmonid water), or species protected by EC Legislation Ecology and Nature Conservation. Groundwater Source Protection Zone (SPZ) 1. Groundwater locally supports a Ground Water Dependent Terrestrial Ecosystem (GWDTE) or any other very significant feature Principal aquifer providing a regionally important resource or protected site.
High	Locally significant attribute of high importance	Watercourse having a WFD classification shown in a RBMP and with Q95 < 1m3/s. Species protected under EC or UK Legislation Ecology and Nature Conservation. Groundwater SPZ 2. Groundwater supports a GWDTE or any other significant feature. Principal aquifer providing locally important resource or supporting a river ecosystem. Essential infrastructure, highly vulnerable and more vulnerable development (as defined in Table 2 of the Flood Risk technical guidance section of the NPPF) and associated users, including residents.
Medium	Moderate quality and rarity	Watercourse not having a WFD classification shown in a RBMP and with Q95 > 0.001m3/s. Aquifer providing water for agriculture or industrial use with limited connection to surface water. Groundwater SPZ 3. Less vulnerable development (as defined in Table 2 of the Flood Risk technical guidance section of the NPPF) and associated users, including construction workers.
Low	Lower quality	Watercourse not having a WFD classification shown in a RBMP and with Q95 < 0.001m3/s. Unproductive strata.

Determining Magnitude of Impacts

16.7.22. The criteria used to determine the magnitude of impacts is presented in **Table 16-6.**

Table 16-6: Criteria for determining magnitude of impact

Level of Magnitude	Definition of Magnitude	Typical Examples
Major Adverse	Results in loss of attribute and/or quality and integrity of the attribute.	Loss or extensive change to a fishery; Loss or extensive change to a designated nature conservation site; Loss of regionally important public water supply Reduction in WFD classification; High likelihood of pollution from solubles and sedimentation Risk of pollution from spillage >2% annually; Loss of, or extensive change to, an aquifer; Potential high risk of pollution to groundwater from routine runoff; Loss of, or extensive change to GWDTE or baseflow contribution to protected surface water bodies; Loss or significant damage to major structures through subsidence or similar effects; A major increase in the likelihood, depth or extent of flooding as a consequence of the development (existing receptors) sufficient to put life at risk; High probability/risk of flooding potentially affecting receptors introduced as part of the development, sufficient to put life at risk; Large increase in discharge in sewerage network combined with significant capacity issues of the network
Moderate Adverse	Results in effect on integrity of attribute, or loss of part of attribute.	Partial loss in productivity of a fishery; Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies; Contribution to reduction in WFD classification; Moderate likelihood of pollution from solubles and sedimentation; Risk of pollution from spillage <2% annually; Partial loss or change to, an aquifer; Potential high risk of pollution to groundwater from routine runoff; Partial loss of the integrity of GWDTE; Damage to major structures through subsidence or similar effects or loss of minor structures; Some increase in the likelihood, depth or extent of flooding as a consequence of the development (existing receptors) which can cause significant damage; Medium probability/risk of flooding potentially affecting receptors introduced as part of the development, which can cause significant damage; Moderate increase in discharge in the sewerage network combined with some lack of capacity of the network

Level of Magnitude	Definition of Magnitude	Typical Examples
Minor Adverse	Results in some measurable change in attribute's quality or vulnerability	Moderate likelihood of pollution from either solubles or sedimentation; Risk of pollution from spillage <1% annually; Minor effects on water supplies; Potential high risk of pollution to groundwater from routine runoff; Minor effects on an aquifer, GWDTEs, abstractions and structures; Measurable but limited in size or magnitude increase in the probability, depth or extension of flooding (existing receptors); Measurable but limited risk of flooding potentially affecting receptors introduced as part of the development.
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity	The proposed project is unlikely to affect the integrity of the water environment; No risk to water quality from solubles or sedimentation; Risk of pollution from spillage <0.5% annually; No measurable impact upon an aquifer and/or groundwater receptors; Negligible change in flood risk as a consequence of the development (existing receptors)/negligible flood risk affecting receptors introduced as part of the development.
Minor Beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring	Reduction in baseline pollution from either solubles or sedimentation; Reduction in existing spillage risk by 50% or more (when existing spillage risk is <1% annually); Reduction of groundwater hazards to existing structures; Reductions in waterlogging and groundwater flooding; Measurable but limited in size or magnitude increase in the probability, depth or extension of flooding (existing receptors).
Moderate Beneficial	Results in moderate improvement of attribute quality	Reduction in baseline pollution from both solubles or sedimentation; Reduction in existing spillage risk by 50% or more (when existing spillage risk is >1% annually); Contribution to improvement in WFD classification; Improvement in water body catchment abstraction management strategy classification; Support to significant improvements in damaged GWDTE; Some reduction in the likelihood, depth or extent of flooding as a consequence of the development (existing receptors) which can cause reduce potential damage caused by flooding; Moderate reduction in discharge in sewerage network providing some improvement in capacity.

Level of Magnitude	Definition of Magnitude	Typical Examples
Major Beneficial	Results in major improvement of attribute quality	Removal of existing pollution from solubles and sedimentations; Improvement in WFD classification; Recharge of an aquifer; A major reduction in the likelihood, depth or extent of flooding as a consequence of the development (existing receptors) sufficient to reduce risk to life; Large reduction in discharge into the sewerage network freeing up significant capacity
No change		No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Determining Significant of Effects

16.7.23. The combination of receptor sensitivity and magnitude of impact will be used to determine the significance of each effect by using the matrix in **Table 16-7**. This matrix is based on that provided in Table 3.8.1 of the DMRB LA 104.

16.7.24. Effects which are moderate or above will be considered to be significant.

Table 16-7: Significance Matrix

Sensitivity of Receptor	Magnitude of Impact				
	Major	**Moderate**	**Minor**	**Negligible**	**No Change**
Very High	Very Large	Large	Moderate	Slight	Neutral
High	Large	Moderate	Slight	Slight	Neutral
Medium	Moderate	Moderate	Slight	Neutral	Neutral
Low	Slight	Slight	Neutral	Neutral	Neutral

16.8. LIMITATIONS AND ASSUMPTIONS

16.8.1. To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- This EIA Scoping Report is based on currently available information and can be subject to change as the design progresses. This is of particular importance when considering potential impacts associated with the quality of surface water runoff, hydromorphology and channel hydraulics, and flood risk.
- A site walkover has not been carried out to inform the Study Area or the scoping of potential receptors. A site walkover will be completed to inform the assessment of effects and the elements scoped into the assessment will be confirmed during the ES.
- Drainage information is not currently available for the above-ground elements of the Proposed Development and therefore potential impacts and likely mitigation are assumed based on standard design practices. It is assumed that detailed design information for the drainage of the Proposed Development will be made available for the completion of the ES. This will be essential to the detailed assessment of risks associated with water quality and increased flood risk.
- A data request has not been submitted in time to support this EIA Scoping Report and therefore the ES may scope in or out additional features identified through the data request response.

- It was not possible to consult with the Environment Agency or Natural Resources Wales regarding the scope of the WFD assessment prior to the completion of this EIA Scoping Report. This scope of the WFD assessment has been determined by professional experience and judgement.

16.9. REFERENCES

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17. CUMULATIVE EFFECTS

17.1. INTRODUCTION

17.1.1. The Environmental Statement (ES) will assess the potential for significant cumulative environmental effects as a result of the Proposed Development in accordance with Schedule 4, paragraph 5(e) of EIA Regulations. The purpose of the assessment is to assess whether the combination of multiple effects upon a common receptor would result in an effect of greater significance than the individual effects alone.

17.1.2. The assessment will consider the various different ways in which cumulative effects can occur. This will include, where relevant, considering the potential for cumulative effects to occur as a result of the Proposed Development interacting with other parts of the Project.

17.2. PROPOSED ASSESSMENT METHODOLOGY

17.2.1. There is no widely accepted methodology or best practice for the assessment of Cumulative Effects, although there are several guidance documents available, including PINS Advice Note 17 (**Ref. 17-1**), which will inform the approach taken to cumulative effects.

17.2.2. The assessment will consider the following types of cumulative effects:

- **Intra-project combined effects** – the interaction and combination of different residual (post-mitigation) environmental effects of the Proposed Development affecting the same Receptor. For example, visual and noise effects during construction affecting the same residential dwelling; and
- **Inter-project cumulative effects** – the residual (post-mitigation) environmental effects of the Proposed Development combining and interacting with the residual environmental effects of committed development/s, including consideration of other parts of the Project, affecting the same Receptor. For example, cumulative construction traffic effects upon a residential dwelling from the Proposed Development and a proposed housing development.

17.2.3. As noted in **Chapter 1: Introduction**, the Proposed Development forms part of the Project. The Project will include other components (e.g. Existing Pipeline Works and Hydrogen Production Plants) which, at the time of completing the cumulative assessment, will be at different stages of development and will be seeking separate consents by the appropriate routes. As discussed in the methodology for Inter-Project cumulative effects that follows, the other components of the Project that need to be considered as part of the assessment will be agreed with the Local Planning Authorities in advance of completing the assessment.

17.2.4. The assessment will be qualitative and based on environmental information available at the time of the assessment. However, partial quantitative assessments may be undertaken where reliable and accurate environmental data allows.

17.2.5. Where information is not available, assumptions will be made based on professional judgement and clearly stated alongside any uncertainty as part of the assessment.

INTRA-PROJECT COMBINED EFFECTS

17.2.6. The approach to the assessment of intra-project combined effects for the Proposed Development only will consider the changes in baseline conditions at common sensitive receptors. It will be based on the information and Study Areas within the technical chapters. It will consider residual effects only.

17.2.7. The assessment will initially review the ES chapters to identify the receptors which are predicted to be subject to residual effects from more than one environmental topic. A qualitative assessment will then be undertaken upon these receptors, using professional judgement and the information provided within the technical chapters, to determine the overall intra-project combined effect significance.

17.2.8. The assessment of intra-project combined effects will be presented in **Chapter 18** of the ES.

INTER-PROJECT CUMULATIVE EFFECTS

17.2.9. The assessment methodology for inter-project Cumulative Effects will involve the following key steps.

Step 1 – Identification and evaluation of projects for consideration

17.2.10. An initial ‘long list’ of ‘other developments’ will be identified through a search of the local planning authorities’ planning registers, the Planning Inspectorate’s planning register and local plans.

17.2.11. Other reasonably foreseeable projects will also be identified, including those that form part of the Project. Based on professional judgement, the initial search will be based on a search area of 15km for NSIPs and 2km for other projects.

17.2.12. The following selection criteria will be applied:

- Major development (**Ref. 17-2**) or NSIP projects that are under construction;
- Major development or NSIP projects which have been permitted within the last five years that are not yet implemented;
- Major development or NSIP submitted applications(s) but not yet determined;
- Projects on PINS Programme of Projects;

- Major development or NSIP projects which have been refused but are subject to appeal procedures not yet determined;
- Projects identified in relevant development plans (and emerging development plans) which would have the characteristics of a Major development;
- Other plans and programmes (as appropriate) which set out the framework for future development consents/approvals, where such development is reasonably likely to come forward and would likely be a Major development or NSIP; and
- Other developments which form part of the Project.

17.2.13. Following this data collection, the long-list will be refined to a short-list by reviewing each of the 'other developments' identified against the following criteria:

- Would the Construction or Operational Phase overlap with the Proposed Development?
- Is there potential that the Proposed Development shares common sensitive Receptors with the project?
- The project has environmental assessment information that is publicly available and is sufficient to allow the identified receptors and residual effects of the 'other development' to be understood. Projects that have no, or insufficient environmental assessment information, will typically not be considered as it will not be possible to accurately identify common receptors or cumulative effects.

17.2.14. Professional judgement has been applied to develop the above criteria. It is not anticipated that projects outside of the criteria set out above would give rise to greater or different likely significant effects together with the Proposed Development considering the scale and nature. However, professional judgement may be applied to support the exclusion of projects which exceed the thresholds, but which may not give rise to discernible cumulative effects on receptors, and vice versa. The reasons for including or excluding each project will be clearly stated.

17.2.15. The long and short lists will be sent to the relevant Local Planning Authorities for comment, input and agreement prior to progressing to the next assessment step. The lists will be prepared towards the end of the EIA programme, so as to ensure that the search of 'other developments' is as up to date as possible whilst also ensuring that there is sufficient time to complete the assessment. The cut-off date for the development of the long and short lists will be noted in the ES.

Step 2 – Identification of Common Receptors

17.2.16. A list of common sensitive Receptors will be prepared by identifying receptors which are listed as one of the five receptor categories set out in Regulation 5(2) of the EIA Regulations. This corresponds with Stage 3 of PINs Advice Note 17.

17.2.17. Once identified, the specific receptors will then be evaluated to ensure that inter-project Cumulative Effects are duly considered at the receptor level and that a more detailed level of assessment is only undertaken where there is a common sensitive receptor and a likely effect.

Step 3 – Assessment of inter-project Cumulative Effects

17.2.18. The assessment of the inter-project Cumulative Effects will be based upon the residual effects identified in the technical chapters of the ES, as well as available environmental information for the approved developments. This step corresponds with Stage 4 of PINS Advice Note 17.

17.2.19. The qualitative evaluation at the receptor level will consider the following:

- Combined magnitude of change;
- Sensitivity / value / importance of the receptor / receiving environment to change; or / and
- Duration and reversibility of effect.

17.2.20. Through a combination of evaluating the residual effects presented in the ES and the environmental information available for the 'other development', conclusions will be drawn as to the likelihood for significant inter-project cumulative environmental effects.

17.2.21. Each environmental topic chapter of the ES will present the inter-project cumulative effects assessment of their topic. **Chapter 18** of the ES will then summarise the assessment, including reporting where significant inter-project cumulative effects have been identified.

17.2.22. The ES will also describe measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant Cumulative Effects and, where appropriate, any proposed monitoring arrangements. The means of securing delivery of these measures will be explained.

17.3. LIMITATIONS AND ASSUMPTIONS

17.3.1. The assessment of intra-project combined effects resulting from the Proposed Development will be focused on the residual effects from the construction and operational phases following the implementation of mitigation measures that are secured through DCO requirements or other mechanisms.

17.3.2. The assessment of inter-project cumulative effects will be based on the interpretation and assessment of publicly available data and limited by the level of information available.

17.3.3. There may be cases that ‘other developments’ are screened into the short-list which have environmental information available for some or the majority of topics, but not for others. In such instances, the cumulative assessment for the given ‘other development/s’ may be limited to only those topics which have sufficient environmental information to inform an assessment. However, in such cases, efforts will be made for the topics lacking environmental information to make an assessment based upon assumptions. This will be stated in the ES.

17.3.4. Although environmental information may be available for ‘other developments’, it may be limited in its compatibility where different assessment methodologies or criteria have been used. Where a lack of information limits and/or prevents the cumulative assessment, this will be stated in the ES.

17.4. REFERENCES

- **Ref. 17-1**: The Planning Inspectorate (2019) Cumulative Effects Assessment. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf
- **Ref. 17-2**: Town and Country Planning (Development Management Procedure) (England) Order 2015

18. SUMMARY

18.1.1. It is proposed that the following environmental factors, as listed under Article 3(1) of EU Directive 2014/52/EU, are included in the scope of the EIA:

- Air Quality;
- Climate (Greenhouse Gases and Resilience);
- Cultural Heritage;
- Biodiversity;
- Land and Soils;
- Landscape and Visual;
- Major Accidents and Disasters;
- Materials and Waste;
- Noise and Vibration;
- Population and Health;
- Traffic and Transport;
- Water Resources and Flood Risk; and
- Cumulative Effects.

18.1.2. The assessment of 'Heat and Radiation' has been scoped out of the EIA as discussed in **Chapter 4**.

18.1.3. The topic-specific matters scoped out of further assessment are detailed within **Chapters 5** to **17**. Table 18-1 (overleaf) provides a summary of the topic-specific elements which have been scoped out of further assessment.

Table 18-1: Impacts Scoped Out of Further Assessment

Topic	Element to be scoped out	Phase	Relevant statutory consultee	Justification
Heat	Heat impacts	Construction and Operation	CWCC and FCC	The processes involved in its construction and operation would generate negligible (if any) heat and therefore no significant effects would occur.
Radiation	Radiation impacts	Construction and Operation	CWCC and FCC	The processes involved in its construction and operation would generate negligible (if any) radiation and therefore no effects would occur.
Air quality **Climate** **Cultural Heritage** **Biodiversity** **Land and Soil** **Landscape and Visual** **Materials and Waste** **Noise and vibration** **Population and Health** **Traffic and Transport** **Water**	Impacts arising from Existing Pipeline Works (excluding Block Valve Stations)	Construction and Operation	N/A	No physical works consented within this Application. Therefore, no impact pathways relevant to air quality, climate, cultural heritage, biodiversity, land and soil, landscape and visual, materials and waste, noise and vibration, population and health, traffic and transport, and water.
Air Quality (Chapter 5)	Air quality impacts arising from the operation of the Proposed Development	Operation	Environmental Health at CWCC and FCC	Operational traffic flows are anticipated to be well below any thresholds triggering the need for assessment; for instance, at its most stringent, IAQM guidance states that, within AQMA, 100 vehicles per day is an appropriate assessment criterion. Routine traffic flows associated with the Proposed Development are likely to be well below this level. There is the potential for the release of small quantities of odorous substances during shut down and maintenance operations, however these activities would be highly infrequent (approximately every 5 years) and managed in line with best practice, so are not considered to result in significant effects.
Climate (GHGs) (Chapter 6)	Disposal of waste (A5)	Construction	CWCC and FCC	It is not anticipated that there will be large quantities of waste. Therefore, it is considered that the emissions from the disposal of waste (typically methane from the breakdown of materials in landfill) are unlikely to result in significant effects. This will be reviewed again at the ES stage.
	Land use, land use change and forestry (A5)	Construction	CWCC and FCC	Emissions associated with the clearance and disposal of biomass as part of the Proposed Development are unlikely to result in significant effects, due to the type and quantity of biomass.

Topic	Element to be scoped out	Phase	Relevant statutory consultee	Justification
	Replacement (B4)	Operation	CWCC and FCC	Emissions associated with the replacement of elements of the Proposed Development associated with its operational maintenance are unlikely to result in significant effects. This is because there are not expected to be major replacements associated with the pipeline are expected throughout its lifespan, therefore any resulting emissions would be minimal and non-significant.
	Land use, land use change and forestry (B8)	Operation	CWCC and FCC	Emissions associated with the reduction of the potential for carbon sequestration of carbon dioxide into biomass are unlikely to be large as the existing land type is predominately grassland, which has minimal carbon sequestration potential. In addition, land will be restored following construction and permanent land loss will be minimal. This is therefore unlikely to result in significant effects.
	Decommissioning process (C1)	End of life	CWCC and FCC	When the Proposed Development reaches the end of its useful life, it is expected that the carbon dioxide pipeline and BVS will be left in-situ and the AGI's will be dismantled. It is therefore expected that there would be few emissions associated with decommissioning the Proposed Development (such as fossil fuels and electricity) and these would not significantly contribute to global climate change.
	Transport and disposal of materials (C2-4)	End of life	CWCC and FCC	When the Proposed Development reaches the end of its useful life, it is expected that the pipeline will be left in-situ and the AGI's will be dismantled. It is therefore expected that emissions from transport and disposal of materials as part of decommissioning the Proposed Development are not considered to be large and would not significantly contribute to global climate change.
Climate (Resilience) (Chapter 6)	Construction site Construction workers	Construction	CWCC and FCC	The temporary and short-term nature of construction and the fact that these receptors are deemed to have low sensitivity and exposure to these effects means that no significant effects would occur. This conclusion is also based on the assumption that appropriate mitigation (such as providing adequate PPE and covering materials during high rain or wind events) is implemented where required.
	Carbon dioxide pipeline	Operation	CWCC and FCC	The impact of the change in annual average precipitation and temperature, drought, wind, humidity and storm surge and storm tide would not have a significant effect on the operation of the onshore carbon dioxide pipeline. This is because it is deemed to have low sensitivity and exposure to these factors. This conclusion is also based on the assumption that appropriate design measures are incorporated into the design of the Proposed Development (such as choice of materials), and that appropriate monitoring of structures is undertaken during operation.
	AGIs (including BVS)	Operation	CWCC and FCC	The impact of the change in drought, relative humidity and storm surge and storm tide would not have a significant effect on the operation of the AGIs. This is because they are deemed to have low sensitivity and exposure to these factors. This conclusion is also based on the assumption that appropriate design measures are incorporated into the design of the Proposed Development (such as choice of materials), and that appropriate monitoring of structures is undertaken during operation.

Topic	Element to be scoped out	Phase	Relevant statutory consultee	Justification
Cultural Heritage (Chapter 7)	World Heritage Sites, Registered Parks and Gardens, Registered Battlefields	Construction and Operation	Historic England Cadw	There are no World Heritage Sites, Registered Parks and Gardens, Registered Battlefields are within the Newbuild Infrastructure Scoping Boundary or within 2km of the Newbuild Infrastructure Scoping Boundary and therefore none will be directly physically impacted by the Proposed Development, and their setting would not be impacted during construction and operation.
	Grade II Listed Building Ferry Bank Farm (Record Number 85249)	Operation	Historic England Cadw	Any potential for direct physical impacts based on route alignment will be incurred during the construction phase only. No change in setting during operation as its below-ground nature means it would not be visible from the surface.
	Chester Canal Conservation Area	Operation	Historic England Cadw	Any potential for direct physical impacts based on route alignment will be incurred during the construction phase only. No change in setting during operation as its below-ground nature means it would not be visible from the surface.
	Designated heritage assets within 500m of the carbon dioxide pipeline	Operation	Historic England Cadw	No change in setting during operation as its below-ground nature means it would not be visible from the surface.
	Non-designated below-ground heritage assets and palaeoenvironmental within the Newbuild Infrastructure Scoping Boundary (excluding block valves)	Operation	Historic England Cadw	Any potential for direct physical impacts based on route alignment will be incurred during the construction phase only, therefore no effects are expected during operation.
	Non-designated below-ground heritage assets and palaeoenvironmental deposits at the block valve stations	Construction and Operation	Historic England Cadw	These works are within the existing Flint-PoA Pipeline easement. It is not anticipated there will be any impacts and effects on below ground heritage assets or deposits as they will have been removed during the installation of the existing pipeline.
Land and Soils (Chapter 9)	Contaminated soil and detriment to Human Health	Operation	CWCC and FCC	There is the potential for construction staff to be exposed to contaminants in the ground (particularly in areas currently/ formerly used for industrial purposes) posing potential health related impacts, and subject to the contaminants the effects could be significant. However, contaminated land pathways to human health would be addressed via a Remediation Strategy and incorporated as part of the construction phase, thereby leaving the site ‘suitable for use’ from a contaminated land perspective as part of the operational phase. Therefore, no significant effects are expected during the operational phase.

Topic	Element to be scoped out	Phase	Relevant statutory consultee	Justification
	Controlled Water Body Contamination	Operation	CWCC and FCC	There is no contaminated land source-pathway-receptors linkage identified as part of the operational phase.
	Built Environment – detriment of pipes and cables from aggressive ground contaminants over time.	Construction	CWCC and FCC	It is considered that there is insufficient time for contaminants to impact pipe/ducting materials during the construction phase of the Proposed Development, therefore this would not cause any significant effects during construction.
Landscape and Visual (Chapter 10)	Clwydian Range AONB	Construction and Operation	NRW / NE / FCC / CWCC / Canals & River Trust	The Flint AGI is located approx. 5.8km away from the AONB. Following a review of the Google Viewshed Tool based on a 9m height Proposed Development, it is clear there is no inter-visibility between the AONB and the Proposed Development.
	Receptors beyond 2km	Construction and Operation	NRW / NE / FCC / CWCC / Canals & River Trust	Due the height of the Proposed Development and specific locations, the nature of the temporary effects of the pipeline and the distance viewed, it is unlikely that receptors beyond 2km would experience significant effects.
	Receptors beyond 500m of the four BVS along the existing natural gas Connah's Quay to Point of Ayr pipeline.	Construction and Operation	NRW / FCC	Upon initial desktop review, it is unlikely that there is potential for any significant effects beyond 500m of the Block Valves due to the limited height and extent of these proposed elements.

Topic	Element to be scoped out	Phase	Relevant statutory consultee	Justification
Major Accidents and Disasters (Chapter 11)	Owing to the number and range of elements considered as part of the Major Accidents and Disasters chapter, the elements to be scoped out and the related justification has not been repeated here. Please refer to Table 11-3 of **Chapter 11 - Major Accidents and Disasters** and **Appendix B** for the full list of elements which are scoped in and out, as well as the justification for these decisions. The elements which are scoped out include: • **Geophysical** (Earthquakes / Volcanic Activity / Landslides / Sinkholes / Tsunamis) • **Hydrology** (Avalanches) • **Climatological and meteorological** (Cyclones, hurricanes, typhoons, storms and gales /Thunderstorms / Wave surges / Extreme temperatures: Heatwaves, Low (sub-zero) temperatures and heavy snow / Droughts / Solar Flares / Solar Energetic Particles / Coronal Mass Ejections / Fog / Wildfires: Forest fire, Bush/brush, pasture / Poor Air Quality) • **Biological** (Disease epidemics: Viral, Bacterial, Parasitic, Fungal, and Prion / Animal Diseases: zoonotic (avian, influenza, West Nile virus, Rabies) & non-zoonotic (foot and mouth and swine fever) / Plants • **Societal** (Extensive public demonstrations which could lead to violence and loss of life / Widespread damage to societies and economies / The need for large-scale multi-faceted humanitarian assistance / The hindrance or prevention of humanitarian assistance by political and military constraints / Significant security risks for humanitarian relief workers in some areas / Famine / Displaced population) • **Industrial and urban accidents** (Nuclear / Dam breaches / Mines and storage caverns) • **Transport Accidents** (Road / Rail / Waterways / Aviation) • **Pollution accidents** (Land / Water) • **Utilities failures** (Water supply / Sewage system) • **Malicious attacks** (Chemical, Biological, Radiological, Nuclear / Transport systems / Crowded places / Cyber / Infrastructure) • **Engineering accidents and failures** (Bridge failure / Flood defence failure / Mast and tower collapse / Property or bridge demolition accidents / Tunnel failure/fire)			
Materials and Waste (Chapter 12)	Impacts and effects associated with the extraction of raw resources and the manufacture of products	Construction and operation	CWCC and FCC	Although the Proposed Development would have impacts on this element, the impacts and effects cannot be assured with any accuracy, and hence must be scoped out of the assessment.
	Consumption of material resources associated with the Proposed Development during operation	Operation	CWCC and FCC	Operational activities are not anticipated to require consumption of material resources beyond those necessary for routine repair and maintenance. As such, the impacts associated with material resource consumption are considered to be minimal.
	Disposal and recovery of waste associated with the Proposed Development during operation	Operation	CWCC and FCC	Operation of the Proposed Development is anticipated to generate only minimal waste arisings from minor routine maintenance and repairs. As such, the impacts associated with waste generation and disposal in operation are considered to be minimal.

Topic	Element to be scoped out	Phase	Relevant statutory consultee	Justification
	Lifecycle assessment (including embodied carbon and water) of materials and site arisings, and waste	Construction and Operation	CWCC and FCC	Although there will be impacts on materials and generation of site arisings and waste, the effort and resources required to undertake a full lifecycle assessment of these elements are deemed disproportionate to the benefit they would offer the assessment of effect significance.
	Impacts and effects resulting from the transportation of material resources and waste to and from the site	Construction and Operation	CWCC and FCC	The impacts associated with transportation will be considered as part of the air quality, climate, traffic and transport, and noise and vibration assessments – as appropriate to these specialist topics.
	Impacts and effects on human health and controlled waters as a result of any contaminated site arisings from the Proposed Development	Construction and Operation	CWCC and FCC	Impacts and effects on human health and controlled waters will be considered in the geology and soils assessment, as appropriate to this specialist topic.
Noise and vibration (Chapter 13)	Road traffic Noise impacts arising from the operation of the Proposed Development	Operation	Environmental Health Officer at CWCC and FCC	Road traffic movements during operation of the Proposed Development are not expected to adversely affect nearby noise sensitive receptors.
	Vibration impacts arising from the operation of the Proposed Development	Operation	Environmental Health Officer at CWCC and FCC	Activities associated with the operational development are not expected to generate significant vibration levels.
Population and Health (Chapter 14)	Community Land and Assets	Operation	CWCC and FCC	Access to community land and assets will be permanently maintained during the operation of the Proposed Development. The potential loss in visual amenity to community land and assets will be covered within the landscape and visual assessment (Chapter 10 – Landscape and Visual). No significant operational effects have therefore been identified.
	Development Land and Businesses	Construction and Operation	CWCC and FCC	Whilst businesses are located along the route alignment, it is assumed that access will remain open during construction, and there is not anticipated to be significant disruption which would affect business operations. Contractors would liaise with businesses to ensure they are aware of the timing of construction works. There are not anticipated to be operational effects on development land and businesses.

Topic	Element to be scoped out	Phase	Relevant statutory consultee	Justification
	Agricultural Land Holdings	Construction and Operation	CWCC and FCC	Whilst there is potential for adverse effects on agricultural land along the route alignment during construction, these are likely to be negligible or minimal as best practice techniques will be used. Once operational the land tunnelled for the cable route will be reinstated, allowing normal agricultural use to resume, and hedges, fences and other features will be replanted and replaced. Therefore, the baseline environment is not anticipated to change materially, and no significant effects have been identified.
	Public Access for WCHs	Operation	CWCC and FCC	There are not anticipated to be significant effects on PRoW, as they would be returned to use or permanently diverted, and these are likely to be negligible or minimal and therefore have been scoped out of further assessment.
	Health	Operation	CWCC and FCC	Once operational, there are unlikely to be any significant effects on human health as the ground will be contained within the existing pipeline route and the baseline environment is not anticipated to change materially.
Traffic and Transport (Chapter 15)	Severance, Driver Delay, Pedestrian Delay, Pedestrian Amenity, Fear and Intimidation, Highway Safety	Operation	CWCC, FCC, HE, and NMWTRA	The operation of the Proposed Development will not result in increased traffic flow or changes to traffic composition.
Water (Chapter 16)	Ordinary watercourses upstream or upslope of the Proposed Development	Construction and Operation	EA, NRW, CWCC, and FCC	The Proposed Development will not directly or indirectly affect these water bodies due to the directional flow of the waterbodies.
	Ponds / lakes upslope of the Proposed Development	Construction and Operation	EA, NRW, CWCC, and FCC	The Proposed Development will not directly or indirectly affect these water bodies due to the directional flow of the waterbodies.
	Impact to public water supply	Construction and Operation	EA, NRW, CWCC, and FCC	The impact of the Proposed Development on public water supply during construction and operation is not considered to be significant.
	Manchester Ship Canal GB71210004	Construction and Operation	EA, NRW, CWCC, and FCC, and Canal and Rivers Trust	The Canal is sufficiently downstream of Proposed Development for potential indirect impacts to be insignificant.