HyNet North West

ENVIRONMENTAL STATEMENT (VOLUME III)

Appendix 13.1 Major Accidents and Disasters Long List (Clean)

HyNet Carbon Dioxide Pipeline DCO

Planning Act 2008

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

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APPENDIX 13-1 – MAJOR ACCIDENTS AND DISASTERS LONG LIST

Table 1 – Major Accidents and Disasters Long List

MA&D Event Group	MA&D Event Category	MA&D Event Type (Hazard Description)	Topic Chapter(s) with Relevant Information	Relevant to Newbuild Infrastructure Boundary?	Stages which Exacerbate Vulnerability	Potential Receptors	Justification for Inclusion/Exclusion in Short List	Short List?
Natural Hazards	Geophysical	Earthquakes	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	N	N/A	N/A	Do not occur in Britain of a sufficient intensity, to cause significant damage, 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 (**Ref. 1)** 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 DCO Proposed Development is not in or close to an active area.	N
Natural Hazards	Geophysical	Volcanic Activity	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	N	N/A	N/A	The DCO 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 DCO Proposed Development.	N
Natural Hazards	Geophysical	Landslides	**Chapter 11 - Land and Soils (Volume II)**	N	N/A	N/A	The topography of the land within the Newbuild Infrastructure Boundary is mostly relatively flat or gently undulating land. Historical landslides have not been recorded within the Newbuild Infrastructure Boundary and the DCO Proposed Development does not involve the formation of deep cuts/high embankments. In designing the DCO Proposed Development to applicable standards, resources and receptors would not be put at a greater risk as a consequence of the DCO Proposed Development.	N
Natural Hazards	Geophysical	Sinkholes	**Chapter 11 - Land and Soils (Volume II)**	N	N/A	N/A	The superficial soils underlying the DCO Proposed Development route include the following; Alluvium, Glacial Till (Diamicton), Peat, Glacial Sand and Gravel and Head Deposits. The bedrock geology that underlies the DCO 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 DCO Proposed Development to warrant taking this event forward.	N

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Natural Hazards	Geophysical	Tsunamis	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	N	N/A	N/A	The DCO Proposed Development is not located in a tsunami risk zone.	N
Natural Hazards	Hydrology	Coastal Flooding	**Chapter 3 - Description of the DCO Proposed Development (Volume II)** **Chapter 18 - Water Resources and Flood Risk (Volume II)** **Appendix 18-4 – Flood Risk Assessment (Volume III)** **Appendix 18-5 – Flood Consequence Assessment (Volume III)**	Y	C	Public and local community Property Workers	The floodplains of the Dee Estuary and River Gowy, as well as land east of Elton, are at risk of coastal/tidal flooding. The Flood Risk Assessment (**Document Reference: D.6.3.18.4 Appendix 18-4**) identifies that Pipe Reach 1 and Pipe Reach 2 of the Newbuild Carbon Dioxide Pipeline lie partially within Flood Zone 3, however, this is a tidal defended area. Pipe Reach 3 and Pipe Reach 4a are not located in an area subject to tidal flooding. The six proposed BVSs along the Stanlow AGI to Flint AGI Pipeline and the Flint Connection to PoA Terminal 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 Ince and Stanlow AGIs are located in an area where the likelihood of tidal flooding is expected to be low. The Rock Bank and Mollington BVSs are located in an area where the likelihood of tidal flooding is considered to be negligible. It is therefore considered that the risk of coastal flooding does not require further assessment and as such has been scoped out.	N
Natural Hazards	Hydrology	Fluvial Flooding	**Chapter 3 – Description of the DCO Proposed Development (Volume II)** **Chapter 18 – Water Resources and Flood Risk (Volume II)** **Appendix 18-4 – Flood Risk Assessment (Volume III)** **Appendix 18-5 – Flood Consequence Assessment (Volume III)**	Y	C,O	Aquatic environment and ecological receptors Properties Road Users Public and local community	The DCO 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 DCO 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 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	Y

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							• Land at Ewloe Green (Date not published). In the location that the DCO Proposed Development crosses 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 responsibility for the flood defences lies with the Environment Agency. The six proposed BVSs along the Stanlow AGI to Flint AGI Pipeline and the Flint Connection to PoA Terminal 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 BVSs at 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. The Flood Risk Assessment (**Document Reference: D.6.3.18.4 - Appendix 18-4**) identifies that the likelihood of fluvial flooding at the proposed Ince and Stanlow AGIs is low.	
Natural Hazards	Hydrology	Pluvial Flooding	**Chapter 3 - Description of the DCO Proposed Development (Volume II)** **Chapter 18 - Water Resources and Flood Risk (Volume II)** **Appendix 18-4 – Flood Risk Assessment (Volume III)** **Appendix 18-5 – Flood Consequence Assessment (Volume III)**	Y	C,O	Aquatic environment and ecological receptors Properties Road Users Public and local community	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 Manufacturing Complex; • Land adjacent to Gale Brook; • Land adjacent to Thornton Main Drain; • 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; • Land south west of Chester Road, Sandycroft; and	Y

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							• Land south of Flint AGI. The BVSs are located in areas which are at very low risk of surface water flooding (areas of land with 0.1% (or less) chance of flooding each year from surface water). The access to Cornist Lane BVS might be affected by some flooding along the access routes. The drainage strategy at the BVSs (which takes into consideration the potential impacts of climate change) ensures that there is no increase to surface water flood risk to receptors. The Flood Risk Assessment (**D.6.3.18.4 Appendix 18-4**) identifies that the likelihood of surface water flooding at the proposed Ince and Stanlow AGIs is low.	
Natural Hazards	Hydrology	Groundwater Flooding	**Chapter 3 - Description of the DCO Proposed Development (Volume II)** **Chapter 18 - Water Resources and Flood Risk (Volume II)** **Appendix 18-4 – Flood Risk Assessment (Volume III)** **Appendix 18-5 – Flood Consequence Assessment (Volume III)**	Y	C	Property Workers	The Cheshire Strategic Flood Assessment (**Ref. 2**) indicates that few areas within the DCO Proposed Development are susceptible of groundwater flooding. These areas are mainly located within the eastern section of the DCO Proposed Development (Ince AGI and Stanlow AGI) and in proximity of the River Dee. The Groundsure report (**Ref. 3**) indicates that the three BVSs on the Flint Connection to PoA Terminal Pipeline have a low to negligible groundwater flood risk, related to the low permeability glacial till deposits. The 2018 Flintshire Strategic Flood Consequence Assessment (**Ref. 4**) indicates that Babell BVS is in an area at risk of flooding to subsurface assets but risk to surface assets is expected to be low. A low groundwater flood risk is also expected for the other BVSs. The detailed design of the DCO Proposed Development will take into consideration the potentially rising groundwater table at the BVS due to climate change. The design intent for the AGIs and BVSs is to be located above projected potential flood levels.	Y
Natural Hazards	Hydrology	Avalanches	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	N	N/A	N/A	Not considered relevant given the geographical location of the DCO Proposed Development. The topography of the Newbuild Infrastructure Boundary is relatively flat and therefore an avalanche could not occur.	N
Natural Hazards	Climatological and Meteorological	Cyclones, hurricanes, typhoons, storms and gales	**Chapter 3 - Description of the DCO Proposed Development (Volume II)** **Chapter 7 - Climate Resilience (Volume II)**	Y	C,O	Property Workers	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. In 2022 the UK has seen three storms (Eunice, Dudley and Franklin) with two rare red warnings issued. Storm Eunice was the most severe and damaging storm to affect England and Wales since February 2014. Winds gusted at over 81mph in exposed coastal locations and a gust of	N

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							122mph was recorded at the Isle of Wight. Storms Dudley and Franklin also brought significant weather impacts. Storms and gales could result in damage to the AGIs and the BVSs; however, the risk is no different to other infrastructure in the locality.	
Natural Hazards	Climatological and Meteorological	Thunderstorms	**Chapter 3 - Description of the DCO Proposed Development (Volume II)** **Chapter 7 - Climate Resilience (Volume II)**	Y	C,O	Workers	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 DCO Proposed Development.	N
Natural Hazards	Climatological and Meteorological	Wave surges	**Chapter 3 - Description of the DCO Proposed Development (Volume II)** **Chapter 18 - Water Resources and Flood Risk (Volume II)**	Y	C,O	Property Workers	The DCO 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 Carbon Dioxide Pipeline is below ground and therefore would not be subject to the direct hydraulic forces of a wave surge. The BVSs are far enough inland not be subject to wave surges. The Ince and Stanlow AGIs are located in an area where the likelihood of tidal flooding is expected to be low and therefore will not be subject to wave surges. The only receptors would be workers who are out of scope of the MA&D assessment (**Section 13.4** of **Chapter 13 – Major Accidents and Disasters (Volume II)**).	N
Natural Hazards	Climatological and Meteorological	Extreme temperatures: Heatwaves Low (sub-zero) temperatures and heavy snow	**Chapter 7 - Climate Resilience (Volume II)**	Y	C,O	Workers	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.	N

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							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 no different to similar infrastructure in the locality. Specific measures are therefore not considered to be required as part of the DCO Proposed Development. The only receptors would be workers who are out of scope of the MA&D assessment.	
Natural Hazards	Climatological and Meteorological	Droughts	**Chapter 3 - Description of the DCO Proposed Development (Volume II)** **Chapter 11 - Land and Soils (Volume II)** **Chapter 7 - Climate Resilience (Volume II)**	Y	C,O	Aquatic environment and ecological receptors Public and local community Properties Workers	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 DCO Proposed Development should not be vulnerable to drought as water is not an essential service during the construction, or operational stages. The design of the DCO Proposed Development will be resilient to ground shrinkage and should remain in the design risk register until designed out. On this basis, drought has been scoped out from further assessment.	N
Natural Hazards	Climatological and Meteorological	Severe Space Weather: Solar Flares	N/A	N	N/A	N/A	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 DCO Proposed Development. However, the DCO Proposed Development is no more vulnerable than other similar infrastructure in the locality.	N
Natural Hazards	Climatological and Meteorological	Severe Space Weather: Solar Energetic Particles	N/A	N	N/A	N/A	Solar energetic particles which cause solar radiation storms, but only in outer space, so this major event type can be scoped out.	N
Natural Hazards	Climatological and Meteorological	Severe Space Weather: Coronal Mass Ejections	N/A	N	N/A	N/A	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 road users or infrastructure.	N

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Natural Hazards	Climatological and Meteorological	Fog	N/A	Y	C	Public and local community Workers	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 DCO Proposed Development, however in this event, construction works would cease until weather conditions had improved. This would be included in the Construction Environmental Management Plan produced by the Construction Contractor.	N
Natural Hazards	Climatological and Meteorological	Wildfires: Forest fire, Bush / brush, pasture	**Chapter 7 - Climate Resilience (Volume II)**	N	C,O	Aquatic environment and ecological receptors Properties Workers	The DCO 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	**Chapter 6 - Air Quality (Volume II)** **Chapter 16 - Population and Human Health (Volume II)**	Y	C	Ecological receptors Public and local community Workers	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, which could lead to potential 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. **Operation**: No likely significant effects on local air quality have been identified for the operational phase. In addition, there would be no venting at the BVSs. Following implementation of appropriate mitigation measures as outlined in **Chapter 6 – Air Quality (Volume II)**, no significant residual air quality effects are anticipated during construction and operation of the DCO Proposed Development.	N

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Natural Hazards	Biological	Disease epidemics: - Viral - Bacterial - Parasitic - Fungal - Prion	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	Y	C	Public and local community Workers	The DCO Proposed Development is located in a developed country where the population is in general good health. Disease epidemics in the UK are currently limited to COVID-19, the first cases of which were identified in February 2020. COVID-19 is currently a global pandemic. The vulnerability of the DCO Proposed Development to a MA&D Event caused by this pandemic during construction and operation should be mitigated. This can be achieved by the implementation of the construction contractor's and the Applicant's occupational health and safety processes which meet the government rules and guidelines on the control of spread of COVID-19. The DCO Proposed Development itself is not going to give rise to any disease epidemics. The UK Health Security Agency and Public Health Wales, the executive agencies of the Department of Health and Social Care, are responsible for protecting the nation from public health hazards, preparing for and responding to public health emergencies. One of the functions of the UK Health Security Agency's and Public Health Wales 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' (**Ref. 5)**. This guidance will be considered within the **Outline Construction Management Plan (OCEMP) (Document reference: D.6.5.4)**.	N
Natural Hazards	Biological	Animal Diseases: - zoonotic: • avian influenza • West Nile virus • Rabies - non-zoonotic: • foot and mouth • swine fever	**Chapter 11 - Land and Soils (Volume II)**	Y	C	Aquatic and ecological receptors Public and local community Workers	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 2021/22, 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 Boundary. Animal diseases has been Scoped Out as the operation of the DCO Proposed Development is not going to be the source of any disease epidemics.	N
Natural Hazards	Biological	Plants	**Chapter 9 - Biodiversity (Volume II)**	N	C	Aquatic and ecological receptors Public and local community Workers	Should invasive plant species be identified during ongoing ecological survey works, standard control measures will be implemented by the Construction Contractor during construction to handle and dispose of any diseased plants and/or injurious weeds and prevent their spread. These control measures will be included in the **Register of Environmental Actions and Commitments (REAC)** which forms an appendix to the **OCEMP** (**Document reference: D.6.5.1**).	N

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Technological or Manmade Hazards	Societal	Extensive public demonstrations which could lead to violence and loss of life.	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	Y	C	Workers Public and local community	The DCO Proposed Development is located in developed countries which have steady, yet small population growth. England and Wales are politically stable with no direct border with countries experiencing conflicts. The DCO 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.	**Chapter 3 -Description of the DCO Proposed Development (Volume II)**	N	N/A	N/A	The DCO Proposed Development is located in developed countries which have 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.	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	N	N/A	N/A	The DCO Proposed Development is located in developed countries which have 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.	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	N	N/A	N/A	The DCO Proposed Development is located in developed countries which have 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.	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	N	N/A	N/A	The DCO Proposed Development is located in developed countries which have 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	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	N	N/A	N/A	The DCO Proposed Development is located in developed countries which produce their own crops and import food. They are 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 DCO Proposed Development.	N
Technological or Manmade Hazards	Societal	Displaced population	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	N	N/A	N/A	There will be no displacement of populations as part of the DCO Proposed Development.	N

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Technological or Manmade Hazards	Industrial and Urban Accidents	Major Accident Hazard Chemical sites	N/A	Y	C,O	Public and local community	There are at least 10 Control of Major Accident Hazard (COMAH) sites within a 5km corridor along the DCO Proposed Development. 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 Agro Limited (Upper Tier), Valspar (UK) Corp Ltd (Lower Tier), Great Bear Distribution Limited (Lower Tier). Further consideration of the potential risks associated with these COMAH facilities are assessed as part of the Environmental Statement in **Appendix 13-2** (**Document reference: D.6.3.13.2**).	Y
Technological or Manmade Hazards	Industrial and Urban Accidents	Major Accident Hazard Pipelines	N/A	Y	C	Public and local community	There are several Major Accident Hazard (MAH) pipelines whose consultation distances overlap with the Study Area associated with the DCO Proposed Development. Further consideration of the potential risks associated with these MAH pipelines are assessed as part of the Environmental Statement in **Appendix 13-2** (**Document reference: D.6.3.13.2**).	Y
Technological or Manmade Hazards	Industrial and Urban Accidents	Nuclear	N/A	N	N/A	N/A	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 Study Area along the DCO Proposed Development.	N
Technological or Manmade Hazards	Industrial and Urban Accidents	Fuel storage	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	Y	O	Public and local community Workers	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) is located within 100m of the Newbuild Infrastructure Boundary. Hawarden Airport (also known as Chester Airport) is located approximately 530m south east of the Newbuild Infrastructure Boundary north of Broughton. CLH Pipeline System (CLH-PS) Limited with fuel storage and distribution located within 250m of the Newbuild Infrastructure Boundary. Further consideration of the potential risks associated with fuel storage is assessed as part of the Environmental Statement in **Appendix 13-2** (**Document reference: D.6.3.13.2**).	Y

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Technological or Manmade Hazards	Industrial and Urban Accidents	Dam breaches	**Chapter 18 - Water Resources and Flood Risk (Volume II)**	Y	C	Workers	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 (**Ref. 6**) indicates that the Newbuild Carbon Dioxide 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 Newbuild Carbon Dioxide 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	**Chapter 11 - Land and Soils (Volume II)**	Y	C,O	Public and local community Workers	**Coal Mining:** The Coal Authority (CA) Interactive mapping (**Ref. 7**) indicates that Sections 1, 2, 3, 6 and the Block Valve Stations (Existing Flint Connection) of the Newbuild Infrastructure Boundary are not within Coal Mining Reporting Areas and as such, coal mining related stability risks are not considered further. The CA Interactive mapping (**Ref. 7**) indicates that development high risk areas, requiring coal mining reports, are present along the western extent of Section 4 and along the majority of Section 5. Historical mine shaft and 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. **Quarrying and Mineral Extraction:** Surface ground workings or surface ground working features have been identified within the immediate vicinity of Sections 1 to 6. The three BVSs are also located in areas where underground mining may have occurred. **Lead Mining:** Babell BVS and Pentre Halkyn BVS are located within 6km of Pentre Halkyn and therefore consideration should be given to the potential that lead mining may have occurred in the vicinity of or underlying the BVS sites.	Y

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Technological or Manmade Hazards	Industrial and Urban Accidents	Fires	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	Y	C,O	Cultural heritage sites Public and local community	Fires could be initiated by construction related activities which impact areas adjacent to the DCO Proposed Development. During construction, standard control measures would be implemented by the Construction Contractor to manage the risk of fire. There is the risk of fire and/or explosion from methane associated with the relocation of the slurry tank during the construction phase. There is a working airfield with fuel storage located at Broughton, 530m south-east of the DCO Proposed Development. This is a sufficient distance from the Newbuild Infrastructure Boundary that a fire would not have a significant impact on any part of the DCO Proposed Development. Urban buildings in close proximity of the Newbuild Infrastructure Boundary are low-rise and predominantly residential, although taller commercial properties exist. Notwithstanding this, the risk of fires affecting the Carbon Dioxide Pipeline associated with the DCO 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 and BVSs within the consultation distances of the existing COMAH sites.	Y
Technological or Manmade Hazards	Transport accidents	Road	**Chapter 11 - Land and Soils (Volume II)** **Chapter 18 - Water Resources and Flood Risk (Volume II)**	Y	C	Aquatic environment and ecological receptors Properties Public and local community Workers Road users	Significant transport accidents occur across the UK on a daily basis, mainly on roads, and involving private and/or commercial vehicles. The Newbuild Infrastructure Boundary includes approximately 40 no. 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 Environmental Actions and Commitments (REAC)** that will be submitted alongside the **Outline Construction Management Plan (OCEMP) (Document reference: D.6.5.4)** which accompanies this Environmental Statement.	N

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							The operation of the DCO Proposed Development will not result in increased traffic flow or changes to traffic composition which could have an adverse impact on highway safety.	
Technological or Manmade Hazards	Transport accidents	Rail	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	Y	C	Aquatic environment and ecological receptors Properties Workers Railway	The proposed Newbuild Carbon Dioxide Pipeline 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 Carbon Dioxide 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 Carbon Dioxide Pipeline which will need to be considered in the design.	N
Technological or Manmade Hazards	Transport accidents	Waterways	**Chapter 3 - Description of the DCO Proposed Development (Volume II)** **Chapter 18 - Water Resources and Flood Risk (Volume II)**	Y	C	Waterway users	The Newbuild Infrastructure 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. 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 operational phase.	N
Technological or Manmade Hazards	Transport accidents	Aviation	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	Y	C,O	Public and local community	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 Newbuild Infrastructure Boundary, north of Broughton. During operation, the risks associated with the DCO Proposed Development should be no greater than the baseline situation. As the Carbon Dioxide 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.	N

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Technological or Manmade Hazards	Pollution accidents	Air	**Chapter 6 - Air Quality (Volume II)**	Y	C,O	Environmental receptors Public and local community Workers	**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 has been 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 block valve, it would result in a large-scale release of CO_2 to the environment which could potentially cause a significant adverse impact on local air quality and could potentially cause asphyxiation leading to injury and/or fatality of humans and/or wildlife. As CO_2 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. Therefore, further consideration of this event has been undertaken as part of the Environmental Statement in **Appendix 13-2** (**Document reference: D.6.3.13.2**).	Y
Technological or Manmade Hazards	Pollution accidents	Land	**Chapter 11 - Land and Soils (Volume II)** **Chapter 18 - Water Resources and Flood Risk (Volume II)**	Y	C,O	Ecological receptors Local heritage Public and local community	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 Construction Contractor to manage the risk of spillages and leaks. There is the risk of a large-scale loss of containment event associated with construction activities in the vicinity of the slurry tank and/or the relocation of the slurry tank during the construction phase. During the operational phase there will only be limited hazardous materials stored for maintenance purposes. In addition, the Environmental Management System which will be implemented for the DCO Proposed Development will set out how hazardous materials will be stored and disposed of to minimise the likelihood of environmental impact.	Y

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Technological or Manmade Hazards	Pollution accidents	Water	**Chapter 11 - Land and Soils (Volume II)** **Chapter 18 - Water Resources and Flood Risk (Volume II)**	Y	C,O	Public and local community Water environment	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 Newbuild Infrastructure Boundary 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 Newbuild Infrastructure Boundary, east of Chester and south of the River Dee. Within the eastern section of the Newbuild Infrastructure Boundary DCO Proposed Development (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 Boundary (Wales). A groundwater SPZ is located in the centre of the Flint Connection to Point of Ayr (PoA) Terminal Pipeline route, related to an unknown water abstraction. The most eastern BVS (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. In addition, the Environmental Management System which will be implemented for the DCO Proposed Development will set out how hazardous materials will be stored and disposed of to minimise the likelihood of environmental impact. There is the risk of a large-scale loss of containment event associated with construction activities in the vicinity of the slurry tank and/or the relocation of the slurry tank during the construction phase.	Y
Technological or Manmade Hazards	Utilities failures	Electricity	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	Y	C	Public and local community Workers	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. Preliminary utilities searches along the pipeline corridor have been conducted and feedback acquired from site walkdowns and consultation	Y

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							responses, which has fed into the route design. However, detailed information on the utilities which are located along the length of the Newbuild Carbon Dioxide Pipeline will not be available until the final route of the Newbuild Carbon Dioxide Pipeline is defined.	
Technological or Manmade Hazards	Utilities failures	Gas	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	Y	C	Public and local community Workers	Preliminary utilities searches along the pipeline corridor have been conducted and feedback acquired from site walkdowns and consultation responses, which has fed into the route design. However, detailed information on the utilities which are located along the length of the Newbuild Carbon Dioxide Pipeline will not be available until the final route of the Newbuild Carbon Dioxide Pipeline is defined.	Y
Technological or Manmade Hazards	Utilities failures	Water supply	N/A	N	N/A	N/A	No significant water use associated with the DCO 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	N/A	N	N/A	N/A	No use of the sewage system associated with the DCO 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	**Chapter 3 - Description of the DCO Proposed Development (Volume II) Chapter 11 - Land and Soils (Volume II)**	Y	C	Property Public and local community Workers	A potential exists for encountering unexploded ordnance during construction of the DCO 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 DCO Proposed Development, once operational but no greater than similar developments.	Y
Technological or Manmade Hazards	Malicious Attacks	Attacks Chemical Biological Radiological Nuclear	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	N	N/A	N/A	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 DCO 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	N/A	N	N/A	N/A	Potential systems would include (but are not limited to) railways, buses, passenger ferries, cargo vessels and aircraft. The DCO Proposed Development is unlikely to be a target for this type of event due to the low number of exposed targets.	N

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Technological or Manmade Hazards	Malicious Attacks	Crowded places	N/A	N	N/A	N/A	The DCO 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 DCO 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	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	Y	O	Workers Public and local community	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 DCO 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	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	N	N/A	N/A	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. The DCO Proposed Development would have minimal impact on local infrastructure or be considered a high profile attack. In addition, it is not considered to be more vulnerable to attack than other similar infrastructure in the UK.	N
Technological or Manmade Hazards	Engineering accidents and failures	Bridge failure	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	N	N/A	N/A	Bridge works are not proposed as part of the DCO Proposed Development.	N
Technological or Manmade Hazards	Engineering accidents and failures	Flood defence failure	**Chapter 7 - Climate Resilience (Volume II)** **Chapter 18 - Water Resources and Flood Risk (Volume II)**	Y	C,O	Public and local community Property Workers	Land adjacent to the Dee Estuary within the Newbuild Infrastructure 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 responsibility for these flood defences lies with the Environment Agency. The detailed design of the DCO Proposed Development will include allowances for future climate change predictions that could result in flooding (for example elevating critical plant and equipment). The	N

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							potential risk of breech events is considered in the EIA. It is considered that the Stanlow and Ince 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).	
Technological or Manmade Hazards	Engineering accidents and failures	Mast and tower collapse	N/A	Y	C, O	Public and local community Workers	There is a single wind turbine located in Section 6 of the Newbuild Infrastructure Boundary. The turbine has a hub height of approximately 17.9m and a total height to tip of approximately 24.5m. In accordance with current United Kingdom Onshore Pipeline Operators' Association guidelines (**Ref. 8**) the CO_2 pipeline will be positioned to ensure that there is an exclusion zone of at least 1.5 times the mast height, to minimise the likelihood of damage to the CO_2 pipeline in the event of blade failure; fall of the nacelle or rotor and toppling of the mast for example. This risk should remain in the design risk register. There are no towers or masts being built as part of the DCO Proposed Development.	N
Technological or Manmade Hazards	Engineering accidents and failures	Property or bridge demolition accidents	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	N	C	Public and local community Road users Workers	The DCO Proposed Development does not involve demolition works.	N
Technological or Manmade Hazards	Engineering accidents and failures	Tunnel failure/fire	**Chapter 3 - Description of the DCO Proposed Development (Volume II)**	N	N/A	N/A	There are no tunnel structures proposed as part of the DCO Proposed Development or within the Study Area.	N

REFERENCES

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- **Ref. 2:** Cheshire West and Chester Council. (2016, March). *Level 1 Strategic Flood Risk Assessment*.
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- **Ref. 4:** Welsh Government. (2018). *Flood Consequence Assessments: Climate Change Allowances*. Available online: https://gov.wales/climate-change-allowances-and-flood-consequence-assessments-cl-03-16
- **Ref. 5:** Public Health England (2014). *Communicable disease outbreak management: operational guidance*. Available online: https://www.gov.uk/government/publications/communicable-disease-outbreak-management-operational-guidance
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- **Ref. 7:** The Coal Authority (2022). *Interactive Map Viewer*. Available online: [redacted]
- **Ref. 8:** United Kingdom Onshore Pipeline Operators' Association. (2022). *Requirements for the Siting of Wind Turbines Close to Pipelines Containing Hazardous Fluids*. Available online: [redacted]