HyNet North West

ENVIRONMENTAL STATEMENT (VOLUME II)

Chapter 13 Major Accidents and Disasters (Tracked Change)

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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13.1. INTRODUCTION

13.1.1. This Chapter reports the assessment of the vulnerability of the DCO Proposed Development to the risk of Major Accidents and/or Disasters (MA&D) during construction, operation, and decommissioning. This Chapter describes:

- Relevant, legislation, policy and guidance;
- Consultation undertaken;
- Assessment methodology;
- Baseline conditions;
- Potential effects of the Construction, Operational and Decommissioning Stages of the DCO Proposed Development;
- Potential design, mitigation and enhancement measures;
- Residual effects;
- Monitoring; and
- Next steps.

13.1.2. This Chapter (and its associated appendices) is intended to be read as part of the wider ES, with particular reference to **Chapter 6 Air Quality**, **Chapter 7 Climate Resilience**, **Chapter 9 Biodiversity**, **Chapter 11 Land and Soils**, **Chapter 16 Population and Human Health, Chapter 17 Traffic and Transport**, **Chapter 18 Water Resources and Flood Risk** (**Volume II**) and the **Outline Construction Environment Management Plan (OCEMP) (Document reference: D.6.5.4)**. These Chapters describe the broader environmental context of the risks associated with the MA&D types. These Chapters also outline the proposed measures to prevent or mitigate significant effects and where they have identified emergency scenarios, details of the preparedness for, and proposed response.

13.1.3. This Chapter has been prepared by competent experts with relevant and appropriate experience (**Appendix 5.1 Relevant Expertise and Competency, Volume III**).

13.2. LEGISLATIVE AND POLICY FRAMEWORK

13.2.1. A summary of the international, national, and local legislation, planning policy and guidance relevant to the MA&D assessment for the DCO Proposed Development is set out below.

LEGISLATIVE FRAMEWORK

13.2.2. The applicable legislative framework is summarised as follows:

International

Directive 2014/52/EU amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment **(Ref. 13.1)**

"In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and / or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment. For such projects, it is important to consider their vulnerability (exposure and resilience) to major accidents and / or disasters, the risk of those accidents and / or disasters occurring and the implications for the likelihood of significant adverse effects on the environment."

National

Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 **(Ref. 13.2)**

13.2.3. Schedule 4 Paragraph 8 of the Infrastructure Planning (Environmental Impact Assessment) Regulations (the DCO EIA Regulations) requires:

- A description of the expected significant adverse effects of the DCO Proposed Development on the environment deriving from the vulnerability of the DCO Proposed Development to risks of MA&D that are relevant to the project concerned; and
- If appropriate, a description of the measures envisaged to prevent or mitigate the significant adverse effects of major accidents and / or disasters on the environment and details of the preparedness for and proposed response to such emergencies.

Health and Safety at Work etc. Act 1974 (c. 37) **(Ref. 13.3)**

13.2.4. The Act provides the framework for the regulation of workplace health and safety in the UK. It provides a legal framework for the provision of safe plant and equipment and prevention of harm to people from occupational hazards present in a workplace, including emergencies which may affect those offsite, or visiting the site.

Construction (Design and Management) Regulations 2015 (CDM) **(Ref. 13.4)**

13.2.5. These regulations place legal duties on almost all parties involved in construction work. The regulations place specific duties on Clients, Designers and Contractors, so that health and safety is taken into account throughout the life of a construction project from its inception to its subsequent final demolition and removal.

13.2.6. The Client, Designers and Contractors have to avoid foreseeable risks so far as is reasonably practicable by eliminating hazards associated with the design, construction, operation and maintenance aspects of the DCO Proposed Development.

13.2.7. Therefore, the regulations ensure that mechanisms are in place to continually identify, evaluate and manage safety risks throughout the Design, Construction and Operation Stages of the DCO Proposed Development. Many of the risks identified and managed at the Detailed Design phase also serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the Construction, Operational and Maintenance Stages.

Control of Major Accident Hazards Regulations 2015 (COMAH) **(Ref. 13.5)**

13.2.8. The purpose of the COMAH Regulations is to prevent major accidents involving dangerous substances and limit the consequences to people and the environment of any accidents which do occur.

13.2.9. Carbon Dioxide (CO_2) conveyed by the DCO Proposed Development is not currently listed as a dangerous substance under the COMAH Regulations.

13.2.10. There are at least 10 COMAH sites within a 5km corridor along the DCO Proposed Development. The consultation zone (CZ) associated with at least 5 of these sites overlaps the Newbuild Infrastructure Boundary of the DCO Proposed Development.

The Planning (Hazardous Substances) Regulations 2015 **(Ref. 13.6)**

13.2.11. These regulations transpose the land-use planning requirements of the European Seveso III Directive and relate to the way hazardous substances consents operate, and the way in which the planning system reduces the likelihood and impact of major accidents.

13.2.12. Hazardous substance consents focus on ensuring the safety of the public around the consented site from potential major accident hazards.

13.2.13. Many of the risks identified and managed out at the Detailed Design phase also serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the Construction, Operational and Maintenance Stages.

The Supply of Machinery (Safety) Regulations 2008 **(Ref. 13.7)**

13.2.14. The Regulations aim to remove technical barriers to trade, in particular products, by harmonising national health and safety provisions applicable to such products when they are first placed on the market or put into service in the European Economic Area.

13.2.15. Many of the risks identified and managed in the design of machinery used in and associated with the DCO Proposed Development will serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the Construction and Operational Stages of the DCO Proposed Development.

The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) **(Ref. 13.8)**

13.2.16. DSEAR implements the Chemical Agents Directive 98/24/EC (CAD) and the Explosive Atmospheres Directive 99/92/EC (ATEX 137). DSEAR sets minimum requirements for the protection of workers from fire and explosion risks arising from dangerous substances and potentially explosive atmospheres.

13.2.17. Under the regulations, conveying CO_2 by the DCO Proposed Development will require that mechanisms are in place to identify, evaluate and manage the risk of a major accident due to loss of containment of the CO_2 to ~~as~~ As ~~low~~ Low ~~as~~ As ~~reasonably~~ Reasonably ~~practicable~~ Practicable (ALARP).

13.2.18. Many of the risks identified and managed will serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the Construction and Operational Stages of the DCO Proposed Development.

The Equipment and Protective Systems for Use in Potentially Explosive Atmospheres Regulations 1996 and 2016 **(Ref. 13.9)**

13.2.19. The Regulations implement measures for safety and consumer protection with respect to electrical equipment and any provisions concerning the composition, labelling, marketing, classification or description of electrical equipment intended to be used in potentially explosive atmospheres.

13.2.20. The use of the correct level of intrinsically safe equipment and protective systems will minimise the likelihood of a large-scale release of CO_2 from the DCO Proposed Development and therefore reduce the risk of a major accident.

Occupier's Liability Act 1984 (c.3) **(Ref. 13.10)**

13.2.21. This Act amends the law of England and Wales as to the liability of persons as occupiers of premises for injury suffered by persons other than their visitors.

13.2.22. The Act provides a legal framework for the prevention of harm to people from occupational safety and health hazards present on premises under the control of the Occupier, including to those visiting the premises.

13.2.23. The DCO Proposed Development includes premises controlled by the Applicant which attract visitors who could be impacted by MA&D whilst on/crossing those controlled premises.

The Pipelines Safety Regulations 1996 **(Ref. 13.11)**

13.2.24. The purpose of these Regulations is to ensure that pipelines are designed, constructed and operated properly to ensure their integrity and reduce environmental risks.

13.2.25. CO_2 (in gaseous phase) conveyed by the DCO Proposed Development is not currently defined as a dangerous fluid under these Regulations. Despite this being the case, the Applicant has followed the principle of the Regulations to ensure that risks are identified and managed out at the Design and Pre-Construction Stages. This serves to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the Construction and Operational Stages of the DCO Proposed Development.

13.2.26. In addition, there are several Major Accident Hazard pipelines whose consultation distances overlap with the study area associated with the DCO Proposed Development.

POLICY

National

National Planning Policy Framework 2021 and associated Planning Practice Guidance **(Ref. 13.12)**

13.2.27. The National Planning Policy Framework (NPPF) was released in 2021 and sets out the Government's planning policies for England and how these should be applied and how to achieve sustainable development and address environmental protection.

13.2.28. The NPPF does not set out any principles for the assessment of MA&D.

Overarching National Policy Statement for Energy (EN-1) **(Ref. 13.13)**

13.2.29. National Policy Statement (NPS) EN-1 sets out the assessment principles to which the Secretary of State (SoS) will have regard to in the examination of an energy Nationally Significant Infrastructure Project (NSIP).

13.2.30. NPS EN-1 does not set out any principles for the assessment of MA&D but does include reference to potential generic mitigation measures for environmental impacts for aspects which must be addressed by the ES.

Future Wales the National Plan 2040 **(Ref. 13.14)**

13.2.31. The National Plan sets the direction for development in Wales up to 2040. Future Wales National Plan sits with the Natural Resources Policy, Welsh National Marine Plan, Wales Transport Strategy and the Economic Action Plan.

Planning Policy Wales **(Ref. 13.15)**

13.2.32. Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales.

Flintshire Local Development Plan **(Ref. 13.34)**

13.2.33. The Flintshire Local Development Plan was adopted 24 January 2023 and is in force as of the date of this report.

~~13.2.32.~~13.2.34. Policy EN18: Pollution and Nuisance recognises that in addition to control measures implemented through legislative drivers, the planning policy also has a role to play in "ensuring that polluting or hazardous development does not affect or restrict other uses of land, either now or in the future." It also recognises that "Certain types of development, such as schools, hospitals and housing, may be particularly sensitive to environmental hazards". The Flintshire Local Development Plan does not set out any principles for the assessment of MA&D.

GUIDANCE

~~13.2.33.~~13.2.35. 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:

- Major Accidents and Disasters in EIA: A Primer **(Ref. 13.16)**;
- Guidelines for Environmental Risk Assessment and Management **(Ref. 13.17)**;
- Guideline – Environmental Risk Tolerability for COMAH Establishments **(Ref. 13.18)**; and
- ISO 31000: 2018 Risk Management – Guidelines **(Ref. 13.19)**.

~~13.2.34.~~13.2.36. Additionally, the following have been reviewed to support the identification of potential MA&D:

- The Cabinet Office National Risk Register (2020 Edition) **(Ref. 13.20)**;
- The International Federation of Red Cross & Red Crescent Societies Early Warning, Early Action **(Ref. 13.21)**; and
- The International Disaster Database **(Ref. 13.22)**.

13.3. SCOPING OPINION AND CONSULTATION

RESPONSE TO THE SCOPING OPINION

13.3.1. An EIA Scoping Opinion (**Appendix 1.2 EIA Scoping Opinion, Volume III**) was received by the Applicant from the Planning Inspectorate ('The Inspectorate') on 14 July 2021, including formal responses from Statutory Consultees. A full list of the responses from The Inspectorate and how these requirements have been addressed by the Applicant are set out in **Appendix 1.3 Scoping Opinion Responses (Volume III)**.

CONSULTATION UNDERTAKEN TO DATE

13.3.2. No further consultation has been undertaken to inform the assessment of the vulnerability of the DCO Proposed Development to the risk of MA&D.

13.4. SCOPE OF THE ASSESSMENT

13.4.1. The scope of this assessment has been established through an ongoing scoping process. Further information can be found in **Chapter 5 EIA Methodology (Volume II)** of this ES.

13.4.2. When the Newbuild Carbon Dioxide Pipeline and the existing Flint Connection to PoA Terminal Pipeline reach the end of their useful lives they will be decommissioned by making the pipelines safe and likely leaving them in situ. The associated Above Ground Installations (AGIs) and Block Valve Stations (BVSs) are anticipated to be dismantled. Decommissioning will be in accordance with the Environmental Protection Act 1990 **(Ref. 13.23)**, Construction Design and Management Regulations 2015 **(Ref. 13.4)**, the Health and Safety at Work etc. Act 1974 **(Ref. 13.3)** and the Management of Health and Safety at Work Regulations 1999 **(Ref. 13.24)** (or subsequent replacement legislation). Details of the decommissioning will be included in the management plans which will be required under the aforementioned legislation to make the risk of a MA&D event ALARP.

13.4.3. For the purpose of the EIA, the vulnerability of the DCO Proposed Development to a MA&D event during the Decommissioning Stage is anticipated to be no worse than that for the Construction Stage following the implementation of the aforementioned management plans for decommissioning. Decommissioning and construction have therefore been considered together.

13.4.4. This section provides an update to the scope of the assessment and re-iterates the evidence base for scoping out elements following further iterative assessment.

ELEMENTS SCOPED OUT OF THE ASSESSMENT

13.4.5. The Risk Event types to which the DCO Proposed Development is not considered to be vulnerable, are shown in the Long List of potential major

accident(s) and/or disaster(s) events provided in **Appendix 13.1 Major Accidents and Disasters Long List (Volume III)**. Those MA&D types which have been scoped out have not been considered within this assessment.

~~13.4.6.~~ Receptors that have been excluded from the assessment, are set out in **Table 13.1** below for the reasons described. The Planning Inspectorate has agreed that these matters can be scoped out of the assessment (**Appendix 1.2 EIA Scoping Opinion (Volume III**).

Table 13.1 - Excluded Receptors

Receptor	Justification for Exclusion
Employees of the Applicant and/or its suppliers, whether during construction, operation, or maintenance of the DCO Proposed Development.	Employer's commitment and obligations to manage risks to employees are addressed in the Health and Safety at Work etc Act 1974 (**Ref. 13.3**).
Members of the public who are wilfully trespassing, for example, a breach of the DCO Proposed Development perimeter fencing.	Outside the occupier's legal requirements under the Occupiers' Liability Act 1984 (**Ref. 13.10**).

ELEMENTS SCOPED INTO THE ASSESSMENT

Construction and Decommissioning Stages

13.4.9. The DCO Proposed Development is considered to be potentially vulnerable to the following Risk Event types during the Construction and Decommissioning Stages of the DCO Proposed Development and have therefore been considered within this assessment:

- Fluvial flooding;
- Pluvial flooding;
- Groundwater flooding;
- Major Accident Hazard (MAH) chemical sites;
- MAH pipelines;
- Mines and storage caverns;
- Electricity failure;
- Gas failure; and
- Unexploded ordnance.
- Fires associated with industrial and urban accidents;
- Land pollution accidents; and

19.0.0. Water pollution accidents.~~The DCO Proposed Development is considered to be potentially vulnerable to the following Risk Event types during the Construction and Decommissioning Stages of the DCO Proposed Development and have therefore been considered within this assessment:~~

- ~~Fluvial flooding;~~

- ~~Pluvial flooding;~~
- ~~Groundwater flooding;~~
- ~~Major Accident Hazard (MAH) chemical sites;~~
- ~~MAH pipelines;~~
- ~~Mines and storage caverns;~~
- ~~Electricity failure;~~
- ~~Gas failure; and~~
- ~~Unexploded ordnance.~~

Operation Stage

~~13.4.9.~~13.4.10. The DCO Proposed Development is considered to be potentially vulnerable to the following Risk Event types during the Operation and Maintenance Stage of the DCO Proposed Development and have therefore been considered within this assessment:

- Fluvial flooding;
- Pluvial flooding;
- MAH chemical sites;
- Fuel storage;
- Mines and storage caverns;
- Industrial and urban fires; and
- Air pollution accidents.

~~13.4.10.~~13.4.11. The Long List in **Appendix 13.1 Major Accidents and Disasters Long List (Volume III)** provides the justification for the inclusion of these Risk Event types in the assessment.

13.5. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

STUDY AREA

13.5.1. MA&D types will be considered in the assessment both within and outside the Order Limits along with potential internal and external influencing factors. The following factors and associated distances were adopted for setting the Study Area:

- Manmade features:
  - Airports and airfields within 13 km (the legal distance of the safeguarding zone for licensed airports in the UK);
  - COMAH facilities within 500 m (distance to furthest COMAH installation centre point whose CZ overlaps the DCO Proposed Development);

  - MAH pipelines within 500 m (distance to furthest MAH pipeline whose CZ overlaps the DCO Proposed Development);
  - Nuclear installations within 3 km (distance to The Land Use Planning Outer Consultation Zone);
  - Fuel retail sites (including Liquified Natural Gas, Liquified Petroleum Gas) within 500 m;
  - Rail infrastructure within 100 m; and
  - Transmission lines (gas, electrical, oil/fuels) crossing the Newbuild Infrastructure Boundary.
- Natural features with the potential to create risks within:
  - 3 km (chiefly hydrological and geological, for example dam failure and seismic activity respectively); and
  - 1 km (chiefly hydrological and geological, for example flood risk and unstable ground conditions respectively).

13.5.2. The internal and external influencing factors, which may have high adverse consequences on the DCO Proposed Development, were reviewed for the varying distances identified in **paragraph 13.5.1**, above. At the Scoping stage, it was identified that the key factors were within a 2.5 km corridor either side of both the Newbuild Carbon Dioxide Pipeline and the existing Flint Connection to PoA Terminal Pipeline, in addition to, a 2.5 km radius around the AGIs and BVSs.

13.5.3. The key influencing external factors (such as coastal, fluvial, pluvial and groundwater flooding, major accident hazard sites, major accident hazard pipelines) that may have high adverse consequences on the DCO Proposed Development were assessed and identified to be within 100 m of the DCO Proposed Development (**Ref. 13.25**). Therefore, since the Scoping stage the extent of the Study Area used for the MA&D ES assessment has been reduced to 100 m either side of the Order Limits.

KEY DEFINITIONS

13.5.4. The definitions of key terms used in this Chapter are provided in **Table 13.2** below. These definitions have been developed by reference to the definitions used in EU and UK legislation and guidance (as set out in **Section 13.2**) relevant to major accidents and/or disasters (**Ref. 13.26, 13.21, 13.17, 13.5, 13.27, 13.28, 13.11** and **13.29**) as well as professional judgement in the context of the DCO Proposed Development.

Table 13.2 - Key Definitions

Term	Definition
(Major) Accident	In the context of the DCO 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 consider the extent, severity and duration of harm and the sensitivity of the receptor. Major accidents are defined as low likelihood, high consequence events.

Term	Definition
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 developments within the zone the CD forms.
Disaster	In the context of the DCO 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.
External Influencing Factor	A factor which occurs beyond the limits of the DCO Proposed Development that may present a risk to the DCO Proposed Development, e.g., if an external disaster occurred (for example, earthquake, COMAH site major accident) it would increase the risk of serious damage to an environmental receptor (as described in Section 13.7) associated with the DCO 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 DCO Proposed Development that may present a risk to the DCO 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 DCO Proposed Development and has the

Term	Definition
	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 EIA, the term refers to the 'exposure and resilience' of the DCO Proposed Development to the risk of a major accident and/or disaster. Vulnerability is influenced by Sensitivity, Adaptive Capacity and Magnitude of impact.

METHOD OF BASELINE DATA COLLATION

Desk Study

13.5.6. A desk-based assessment has been undertaken to collate baseline data within the 100 m Study Area. This information has been collated from the following sources which have also been used to support the identification of potential MA&D:

- The Cabinet Office National Risk Register (2020 Edition) (**Ref. 13.20**);
- The International Federation of Red Cross & Red Crescent Societies Early Warning, Early Action (**Ref. 13.21**);
- The International Disaster Database (**Ref. 13.22**);
- HSE COMAH 2015 Public Information (**Ref. 13.30**); and
- **Chapter 6 Air Quality**, **Chapter 7 Climate Resilience**, **Chapter 9 Biodiversity**, **Chapter 11 Land and Soils**, **Chapter 16 Population and Human Health**, **Chapter 17 Traffic and Transport** and **Chapter 18 Water Resources and Flood Risk (Volume II)**.

Site Visit and Surveys

13.5.7. No site visits or surveys have been undertaken as part of the assessment of the vulnerability of the DCO Proposed Development to MA&D.

IMPACT ASSESSMENT METHODOLOGY

13.5.8. To date, there is no specific guidance on how to consider MA&D within the context of EIA. However, the assessment takes account of emerging EIA good practice (**Ref. 13.16, 13.31**, **13.32** and **13.33**) which refers to other relevant documentation, including the Cabinet Office's National Risk Register (**Ref. 13.20**).

13.5.9. The assessment of MA&D has been achieved through a review of available documentation and regulatory requirements. The assessment does not involve assessment from 'first principles' as it is recognised that existing legislation and

health and safety requirements already identify risks and help to protect human beings and the environment.

13.5.10. The assessment presents any identified risks along with whether these are managed to be ALARP or require further precautionary mitigation actions beyond those already integrated into the Preliminary Design and execution of the DCO Proposed Development.

13.5.11. The potential for identified relevant MA&D to result in a significant adverse environmental effect have been evaluated using a risk-based approach. The approach has considered the environmental consequences of a MA&D event, the likelihood of these consequences occurring, considering planned design and embedded mitigation, and the acceptability of the subsequent risk to the relevant receptor. The following process has been applied to each of the scoped in MA&D event categories:

- Identifying risks;
- Screening these risks;
- Defining the impact;
- Assessing the risk; and
- Appraise risk management options.

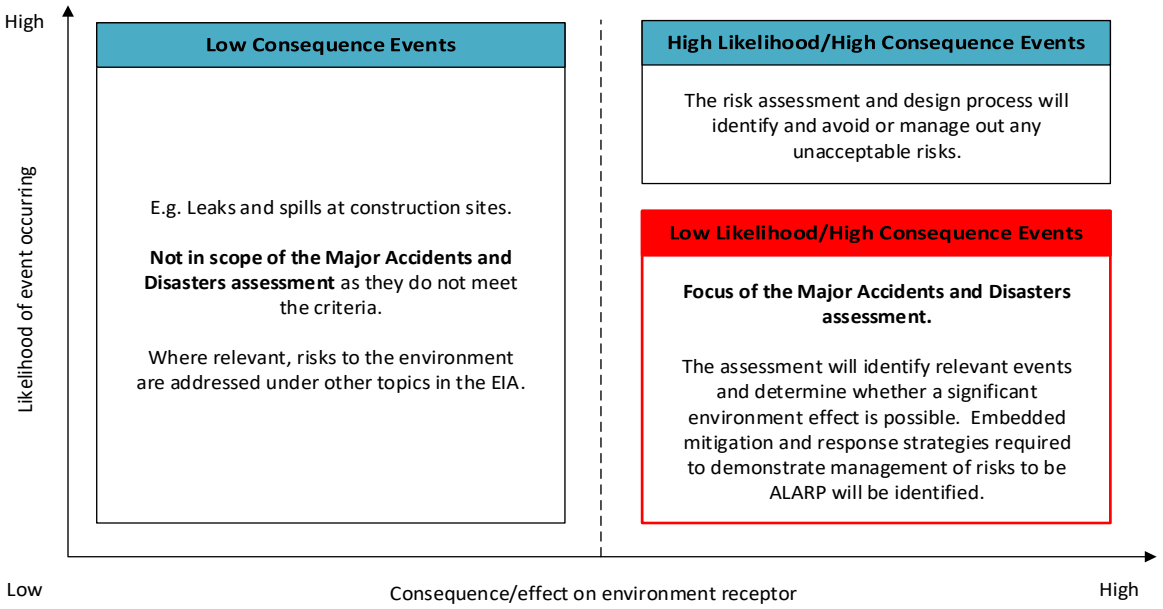
Identify Risks

13.5.12. The MA&D considered in the assessment are rare events.

13.5.13. All low consequence events, whatever their likelihood, do not meet the definition of MA&D as defined in IEMA's Primer (**Ref. 13.16**). For example, minor spills which may occur during construction, but will be limited in area and volume and temporary in nature, do not meet the definition of a major accident. Such minor events will be dealt with under the detailed Construction Environment Management Plan (CEMP) to be produced by the construction contractors and do not fall within the scope of this assessment as included as a Requirement of the **Draft DCO** (**Document Reference: D.3.1**).

13.5.14. This assessment focuses on low likelihood, but potentially high consequence events as illustrated in **Insert 13.1** which is based on Figure 2 in IEMA's Primer (**Ref. 13.16**).

Insert 13.1 - Graphical Representation of Major Accidents and Disasters Consequence Significance



13.5.15. Low likelihood is defined for the purposes of this assessment, as: May occur during the lifetime of the DCO Proposed Development. In accordance with the DCO Proposed Development risk matrix (which is aligned with the UK HSE risk tolerability criteria), no more than once in 10,000 years.

13.5.16. This is an upper boundary for low likelihood. Very low likelihood events will also be included in the assessment, which may only occur at most, according to the DCO Proposed Development risk matrix less than once in 1,000,000 years. Mitigation measures will reflect what is reasonable for such rare events, considering their potential consequence, within the guiding principle of risks being ALARP.

13.5.17. High consequence events are considered to lead to a significant adverse effect.

13.5.18. The risk identification process has used existing sources of information, wherever possible, such as risk assessments undertaken for the DCO Proposed Development as part of other processes (many of which are required by law) or Risk Events identified within the UK's current National Risk Register (**Ref. 13.20**). No additional risk assessments have been undertaken and the risk identification activity has focused on collating and reviewing the existing sources.

13.5.19. In order to identify whether a Risk Event has the potential to be a MA&D event, which also has the potential to have a significant adverse effect on an environmental receptor, three components need to be present: a source, a pathway (between source and receptor) and a receptor. As such, and as recommended by DEFRA (**Ref. 13.17**) the assessment uses the following conceptual model:

- The source is the original cause of the hazard, which has the potential to cause harm;
- The pathway is the route by which the source can reach the receptor; and
- The receptor, which is the specific component of the environment that could be adversely affected, if the source reaches it.

13.5.20. Risk Events which do not have all three components have been screened out from the assessment.

Screen Risks

13.5.21. The following MA&D screening process has been used to identify those Risk Events which will require further consideration within the assessment:

- Is there a potential source, and/or pathway and/or receptor? If not, no further assessment required;
- Is there a relevant environmental receptor present in the locations where the Risk Event could occur, and a pathway whereby the source of harm can reach the receptor? If not, no further assessment required; and
- Does the potential impact on the environmental receptor meet the definition of a significant adverse effect? If not, no further assessment required.

13.5.22. For those Risk Events which are not screened out during the three-step process, the following assessment methodology has been used. The assessment forms the basis for recommending additional mitigation measures, as appropriate.

Define Impact

13.5.23. Several mechanisms are in place to reduce the vulnerability of the DCO Proposed Development to MA&D or mitigate significant effects on the environment should they occur. All measures to manage and reduce the risk of significant adverse effects occurring as a result of the vulnerability of the DCO Proposed Development to MA&D are considered to be embedded mitigation measures for the purposes of the assessment.

13.5.24. It has been assumed that:

- The design, installation, commissioning, operation and maintenance of plant, drainage systems, equipment, and machinery, including associated systems, will consider Good Engineering Practice to ensure compliance with applicable regulatory regimes; and
- The Construction Stage(s) of the DCO Proposed Development will be managed through the implementation of the Construction Stage Plan (required under the CDM Regulations 2015 (**Ref. 13.4**)) and mitigation measures relating to MA&D would be set out by the Construction Contractor for approval prior to construction as part of the detailed CEMP.

13.5.25. A reasonable worst-case environmental impact(s) has been identified for each scoped-in Risk Event. Impacts have been identified in consultation with relevant disciplines for each environmental factor assessed within this ES. The environmental impacts are identified through a qualitative process which seeks to answer the question 'could this event constitute a major accident or disaster in terms of the definitions provided'. Where relevant, specific sensitive receptors around the DCO Proposed Development are considered. The Risk Record (**Appendix 13.2 ES Risk Record, Volume III**) records the outcome of this process.

Assess Risk

13.5.26. The likelihood of the reasonable worst-case environmental effect(s) occurring has been evaluated considering the following:

- The likelihood of the Risk Event occurring considering the measures already embedded into the design and execution of the DCO Proposed Development; and
- The likelihood that an environmental receptor is affected by the Risk Event.

13.5.27. Likelihood assessments evaluate whether the effect (for example, loss of life) is a possible outcome of the Risk Event.

~~13.5.28.~~ This evaluation refers to existing risk assessments as well as consultation with relevant discipline specialists.

13.5.29. The assessment of the risk has been carried out in line with the IEMA Primer on Major Accidents and Disasters in EIA (**Ref. 13.16**). Where likely significant adverse effects are identified, mitigation measures must be in place, commensurate with the likelihood of the event occurring. The assessment considers, in consultation with relevant environmental topics, whether the risk to the environmental receptor is managed to be ALARP with the existing measures. If gaps are identified, where the existing measures do not represent management of risks to an environmental receptor to be ALARP, then additional measures will be required. The Risk Record presented in **Appendix 13.2 ES Risk Record (Volume III)** records the outcome of the assessment.

Appraise Risk Management Options

13.5.30. Risk management options fall into the following categories:

- Eliminate (or 'avoid') the risk, by adopting alternative processes in order to eliminate the source of the hazard or remove the receptor;
- Reduce the risk by adapting proposed processes such that either the likelihood or the impact of the Risk Event can be reduced;
- Isolate the risk, by using physical measures to ensure that should the Risk Event occur, it can be effectively isolated such that there is no pathway;
- Control the risk, by ensuring that appropriate control measures are in place (for example emergency response) so that should a Risk Event occur, it can be controlled and managed appropriately. The mitigation hierarchy of repair and compensate any significant damage to environmental receptors may then apply following a control measure; and
- Exploit the risk if it presents potential benefits or new opportunities.

13.5.31. As safety risks will be required to be adequately addressed within the regulatory framework for the DCO Proposed Development, it is not anticipated that significant residual effects, in terms of safety risks, will be identified as an output of the assessment.

SIGNIFICANCE CRITERIA

~~13.5.32.~~ By definition, a major accident and/or disaster would have a major significant effect on the environment/population. Accordingly, any risks that could result in a MA&D event without suitable mitigation, management or regulatory controls in place will be assessed as significant.

ASSUMPTIONS AND LIMITATIONS

13.5.33. The assumptions and limitations for this assessment are detailed below:

- The Detailed Design of the DCO Proposed Development and its implementation is 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.
- The Construction Stage(s) of the DCO Proposed Development will be managed through the implementation of the Construction Stage Plan (required under the CDM Regulations 2015 (**Ref. 13.4**)) (**D-MD-001** of the **REAC, Document reference: D.6.5.1**) and a detailed CEMP which will accord with the Outline Construction Environmental Management Plan **OCEMP** (**Document Reference: D.6.5.4**) that accompanies this ES.
- 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 relevant ES Chapters.
- It is recognised that the management framework for the DCO 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 as part of the appointment of the engineering, procurement, construction and installation contractor(s) and the operation of the DCO Proposed Development by the undertaker.
- The design, installation, commissioning, operation and maintenance of plant, drainage systems, equipment, and machinery, including associated systems, will consider Good Engineering Practice (**D-MD-002** of the **REAC, Document reference: D.6.5.1**).
- In accordance with good safety management principles, it has been assumed that all risks that have the potential to be major accidents and/or disasters, and could impact a local environmental receptor, will be managed using the ALARP principle.
- Prior to commissioning and the introduction of CO_2, the existing pipeline will be verified and confirmed as fit for purpose and any necessary remedial works undertaken to ensure compliance with applicable regulatory regimes.

13.6. BASELINE CONDITIONS

13.6.1. The baseline relevant to this topic comprises:

- Features external to the DCO Proposed Development that contribute a potential source of hazard to it (see **Appendix 13.1 Major Accidents and Disasters Long List, Volume III**);
- Sensitive receptors at risk of significant effect (see **Section 13.7**); and
- Current (without the DCO Proposed Development) MA&D risks for the existing locality (see **Appendix 13.1 Major Accidents and Disasters Long List, Volume III**).

EXISTING BASELINE

13.6.2. MA&D risks relevant to the existing baseline include, inter alia, extreme weather events and associated flooding (as assessed in **Appendix 13.1 Major Accidents and Disasters Long List, Volume III**). Existing baseline conditions are described in detail in the following Chapters: **Chapter 6 Air Quality**, **Chapter 7 Climate Resilience**, **Chapter 9 Biodiversity**, **Chapter 11 Land and Soils**, **Chapter 16 Population and Human Health**, **Chapter 17 Traffic and Transport** and **Chapter 18 Water Resources and Flood Risk (Volume II)**.

FUTURE BASELINE

13.6.3. The future baseline is not anticipated to differ significantly from the current baseline with regards to the vulnerability of the DCO Proposed Development to the risk of MA&D.

13.7. SENSITIVE RECEPTORS

13.7.1. In line with Regulation 5(2) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('the DCO EIA Regulations') (**Ref. 13.2**) the following sensitive receptors were considered with respect to MA&D:

- Population and human health;
- Biodiversity;
- Land, soil, water, air, and climate;
- Material assets, cultural heritage, and the landscape; and
- The interaction between the factors above.

13.7.2. The specific potential receptors of effects resulting from MA&D are reported in the other relevant ES Chapters.

13.8. DESIGN DEVELOPMENT, IMPACT AVOIDANCE, AND EMBEDDED MITIGATION

13.8.1. The Applicant has included embedded mitigation as part of the Preliminary Design through hazard identification studies to reduce the vulnerability of the DCO Proposed Development to the risk of MA&D. Confirmed embedded mitigation is presented within the ES and aligns with other technical topics including **Chapter 6 Air Quality**, **Chapter 7 Climate Resilience**, **Chapter 9 Biodiversity**, **Chapter 11 Land and Soils**, **Chapter 16 Population and Human Health**, **Chapter 17 Traffic and Transport** and **Chapter 18 Water Resources and Flood Risk (Volume II)**.

13.9. ASSESSMENT OF VULNERABILITY TO THE RISK OF MA&D EVENTS

13.9.1. This section details the output of the assessment of the vulnerability of the DCO Proposed Development to the risk of MA&D events, taking account of the mitigation measures detailed in **Section 13.8** above and **Section 13.10** below. All events that have been considered are set out in **Appendix 13.2 ES Risk Record** (**Volume III**).

13.9.2. MA&D events to which the DCO Proposed Development may be vulnerable during construction and operation are summarised below.

Construction Stage~~Construction Stage~~

~~13.9.4.~~ Eight MA&D events have been identified to which the DCO Proposed Development may be vulnerable to during the Construction Stage as detailed in **Table 13.3** below. All events that have been considered are set out in **Appendix 13.2 ES Risk Record (Volume III)**~~Two MA&D events have been identified to which the DCO Proposed Development may be vulnerable to during the Construction Stage as detailed in **Table 13.3** below. All events that have been considered are set out in **Appendix 13.2 ES Risk Record** (**Volume III**)~~.

Table 13.3 - Potential Major Accident and/or Disaster Events during Construction Grouped by High Level Risk Event~~Potential Major Accident and/or Disaster Events during Construction Grouped by High Level Risk Event~~

Risk Record Entry Number	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event Did Occur
2	Striking of underground services/utilities.	Fire and/or explosion or release of harmful gas.	Fire and/or explosion affects neighbouring property and/or members of the public.
16	Damage to a third-party MAH pipeline.	Spillage or longer-term seepage of pollutants into ground/watercourse.	Contamination of ground and/or water supply.
20	Damage to the slurry tank.	Land pollution accident.	Contamination of ground and/or water supply.
21	Damage to the slurry tank.	Water pollution accident.	Contamination of Wepre Brook.
22	Release of methane gas.	Fire.	Fire and/or explosion affects neighbouring property and/or members of the public.
23	Release of slurry resulting from decommissioning/demolition of the slurry tank.	Land pollution accident.	Contamination of ground and/or water supply.
24	Release of slurry resulting from decommissioning/demolition of the slurry tank.	Water pollution accident.	Contamination of Wepre Brook.
25	Presence of Centralised Compounds in the	Water pollution accident	Contamination of the River Dee

Risk Record Entry Number	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event Did Occur
	floodplain of the Tidal River Dee		

~~Risk Record Entry Number~~	~~Risk Description~~	~~Risk Event (High Level)~~	~~Reasonable Worst Consequence if Event Did Occur~~
~~2~~	~~Striking of underground services/utilities.~~	~~Fire and/or explosion or release of harmful gas.~~	~~Fire and/or explosion affects neighbouring property and/or members of the public.~~
~~16~~	~~Damage to a third-party MAH pipeline.~~	~~Spillage or longer-term seepage of pollutants into ground/watercourse.~~	~~Contamination of ground and/or water supply.~~

~~13.9.21.~~13.9.4. Based on the assumptions and mitigation measures put forward in other relevant ES Chapters and **Sections 13.8** above and **13.10** below, it is considered that the identified potential MA&D events above will all be managed to be ALARP.

Operational Stage

~~13.9.22.~~ Seven MA&D events have been identified to which the DCO Proposed Development may be vulnerable to during the Operation and Maintenance Stage as detailed in **Table 13.4** below. All events that have been considered are set out in **Appendix 13.2 ES Risk Record** (**Volume III**).

Table 13.4 - Potential Major Accident and/or Disaster Events during Operation and Maintenance Grouped by High Level Risk Event

Risk Record Entry Number	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event Did Occur
6	Large scale release of CO_2 resulting from a loss of containment event involving an AGI and/or Carbon Dioxide Pipeline and/or block valve.	Fire and/or explosion or release of harmful gas	CO_2 toxicity and fogging hazard affects neighbouring property and/or those people in the immediate area.
7	Damage to AGI equipment which could potentially lead to a loss of containment of CO_2 for a limited period of time resulting from a fire and/or explosion at the Stanlow Manufacturing Complex.	Fire and/or explosion or release of harmful gas.	CO_2 toxicity and fogging hazard affects neighbouring property and/or those people in the immediate area.
10	Damage to AGI equipment which could potentially lead to a loss of containment and release of CO_2 for a limited period of time resulting from an explosion at nearby industrial sites.	Fire and/or explosion or release of harmful gas.	CO_2 toxicity and fogging hazard affects neighbouring property and/or those people in the immediate area.
12	Erosion of support below Carbon Dioxide Pipeline leading to pipeline failure resulting from flooding.	Fire and/or explosion or release of harmful gas.	CO_2 toxicity and fogging hazard affects neighbouring property and/or those people in

Risk Record Entry Number	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event Did Occur
			the immediate area.
15	Fire and/or explosion at fuel storage facility impacts the Rock Bank BVS resulting in a loss of containment event at the BVS and subsequent release of CO_2.	Fire and/or explosion or release of harmful gas	CO_2 toxicity and fogging hazard affects neighbouring property and/or those people in the immediate area.
18	Large scale release of CO_2 resulting from a loss of containment event involving the Carbon Dioxide Pipeline.	Fire and/or explosion or release of harmful gas	CO_2 toxicity and fogging hazard affects neighbouring property and/or those people in the immediate area.
19	Collapse of mine/quarry workings damaging the Carbon Dioxide Pipeline or BVS resulting in a loss of containment event.	Ground collapse	CO_2 toxicity and fogging hazard affects neighbouring property and/or those people in the immediate area.

~~13.9.24.~~13.9.7. Based on the assumptions and mitigation measures put forward in other relevant ES Chapters and **Sections 13.8** above and **13.10** below, it is considered that the identified potential MA&D events above will be managed to be ALARP.

13.10. MITIGATION AND ENHANCEMENT MEASURES

13.10.1. The measures outlined below and the specific mitigation measures which are detailed in **Appendix 13.2 ES Risk Record** (**Volume III**) are considered to be embedded mitigation measures which will be in place for the construction and operation of the DCO Proposed Development to ensure that any potential MA&D events are managed to be ALARP. **Appendix 13.2 ES Risk Record** (**Volume III**) provides details of mitigation measures for each potential MA&D event identified.

13.10.2. The Applicant has committed to constructing and managing the DCO Proposed Development in accordance with the following non-exclusive list of standards and systems:

- Programme of hazard studies (**D-MD-003** of the **REAC, Document reference: D.6.5.1**) to produce an inherently safe design and to ensure residual risks are managed to be ALARP as required by health and safety legislative drivers.
- Environmental, Health and Safety Management systems (**D-MD-004** of the **REAC, Document reference: D.6.5.1**) as required by the COMAH Regulations 2015 (**Ref. 13.5**) and the Pipelines Safety Regulations 1996 (**Ref. 13.11**).
- Manage all construction risks in accordance with the CDM Health and Safety Plan and Construction Stage Plan (**D-MD-005** of the **REAC, Document reference: D.6.5.1**) as required by the CDM Regulations 2015 (**Ref. 13.4**).
- Supplier management environmental, health and safety standards (for example, Construction Skills Certification Scheme) (**D-MD-006** of the **REAC, Document reference: D.6.5.1**) as required by health and safety legislative drivers.
- Risk management systems (**D-MD-007** of the **REAC, Document reference: D.6.5.1**) as required by health and safety legislative drivers.
- Construction and Environmental Management systems (including the detailed CEMP) (**D-MD-008** of the **REAC, Document reference: D.6.5.1**).

13.11. RESIDUAL EFFECTS

13.11.1. Based on the assumptions and mitigation measures put forward in other relevant ES Chapters and **Sections 13.8 and 13.10** above, it is considered that the potential MA&D events identified during the Construction and Operational Stages will be managed to be ALARP.

13.12. IN-COMBINATION CLIMATE CHANGE IMPACTS

13.12.1. The in-combination climate change impact assessment considers the extent to which climate change may alter the effects which have already been identified within this Chapter.

13.12.2. The potential MA&D events that have been considered within this Chapter have been considered against likely climate hazards, as set out within **Chapter 7 Climate Resilience (Volume II)**, and the vulnerability of the DCO Proposed Development to the risk of MA&D events identified are not anticipated to change as a result of these hazards.

13.13. MONITORING

13.13.1. No monitoring in relation to MA&D events is required.

13.14. REFERENCES

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