

ENVIRONMENTAL STATEMENT (VOLUME II)

CHAPTER 13 – MAJOR ACCIDENTS AND DISASTERS

Padeswood Carbon Dioxide Spur Pipeline Proposed Development

Town and Country Planning Act 1990

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13. MAJOR ACCIDENTS AND DISASTERS

13.1. INTRODUCTION

13.1.1. This Chapter reports the outcome of the assessment of events with the potential for likely significant effects arising from the vulnerability of the Padeswood Spur Pipeline Proposed Development to Major Accidents and Disasters (MA&D).

MA&D categories and related types have been considered both within and outside the Red Line Boundary of the Padeswood Spur Pipeline Proposed Development along with potential external influencing factors within the Study Area, such as:

- **Natural Hazards, e.g.:**
 - Geophysical;
 - Hydrological;
 - Climatological and meteorological; and
 - Biological.
- **Technological or manmade hazards, e.g.:**
 - Societal;
 - Industrial and urban accidents;
 - Transport accidents;
 - Pollution accidents;
 - Utility failures;
 - Malicious attacks; and
 - Engineering accidents and failures.

13.1.2. Effects during the Construction and Operation Stages of the Padeswood Spur Pipeline Proposed Development are assessed. The risks associated with decommissioning the Padeswood Spur Pipeline Proposed Development at the end of its useful life, are considered to be similar to those arising during the Construction Stage. In addition, a comprehensive decommissioning and restoration plan will be developed in accordance with the requirements of applicable regulatory regimes at that time (e.g. Construction (Design and Management) Regulations), which will ensure that appropriate measures are in place.

13.1.3. This chapter describes:

- Relevant, legislation, policy and guidance;
- Consultation undertaken;
- Scope of the assessment;
- Assessment methodology;
- Baseline conditions;
- Sensitive receptors;
- Design development and embedded mitigation;
- Assessment of vulnerability to risk;
- Mitigation and enhancement measures;
- Residual effects; and
- Monitoring.

13.1.4. 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 (Document Reference: PW.3.2.6);
- Chapter 7: Climate Resilience (Document Reference: PW.3.2.7);
- Chapter 9: Biodiversity (Document Reference: PW.3.2.9);
- Chapter 11: Land and Soils (Document Reference: PW.3.2.11);
- Chapter 15: Population and Human Health (Document Reference: PW.3.2.15);
- Chapter 16: Traffic and Transport (Document Reference: PW.3.2.16);
- Chapter 17: Water Resources and Flood Risk (Document Reference: PW.3.2.17);
- Chapter 18: Combined and Cumulative Effects (Document Reference: PW.3.2.18); and
- the Outline Environment Management Plan (OEMP) (Document Reference: PW.4.1).

13.1.5. 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.

13.1.6. This Chapter has been prepared by competent experts with relevant and appropriate experience, as outlined in **Appendix 5.1: Relevant Expertise and Competency** (Document Reference: PW.3.3.5.1).

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 Padeswood Spur Pipeline Proposed Development is set out below.

LEGISLATIVE FRAMEWORK

International

13.2.2. The following international legislation is relevant to the MA&D assessment:

Directive 2014/52/EU amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (European Parliament, 2014).

“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

The following national legislation is relevant to the MA&D assessment: Health and Safety at Work etc. Act 1974 (c. 37) (HM Government, 1974)

13.2.3. 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.

Occupier's Liability Act 1984 (c.3) (HM Government, 1984)

13.2.4. 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.

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.

The Padeswood Spur Pipeline 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 Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (HM Government, 2017)

13.2.5. Schedule 4 Paragraph 8 of the Regulations requires:

- A description of the expected significant adverse effects of the Padeswood Spur Pipeline Proposed Development on the environment deriving from the vulnerability of the Padeswood Spur Pipeline Proposed Development to risks of MA&D that are relevant to the project concerned.
- 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.

Construction (Design and Management) Regulations 2015 (CDM) (HM Government, 2015)

13.2.6. 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 considered throughout the life of a construction project from its inception to its subsequent final demolition and removal.

The Client, Designers, and Contractors must avoid foreseeable risks so far as is reasonably practicable by eliminating hazards associated with the design, construction, operation and maintenance aspects of the Padeswood Spur Pipeline Proposed Development.

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 Padeswood Spur Pipeline Proposed Development. Many of the risks identified and managed out at the design stage 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) (HM Government, 2015)

- 13.2.7. 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.

There are three Control of Major Accident Hazard (COMAH) sites within a 5 km corridor along the Padeswood Spur Pipeline Proposed Development. As outlined in **Appendix 13.1: Major Accidents and Disasters Long List (Document Reference: PW.3.3.13.1)** it is considered that the presence of these sites do not require further assessment.

The Planning (Hazardous Substances) Regulations 2015 (HM Government, 2015)

- 13.2.8. 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.

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

Many of the risks identified and managed out at the design stage eliminate or reduce the risk of a major accident (and therefore environmental consequence).

The Supply of Machinery (Safety) Regulations 2008 (HM Government, 2008)

- 13.2.9. 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.

Many of the risks identified and managed in the design of machinery used in and associated with the Padeswood Spur Pipeline Proposed Development eliminate or reduce the risk of a major accident (and therefore environmental consequence).

The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) (HM Government, 2002)

- 13.2.10. 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.

Under the regulations, conveying CO₂ by the Padeswood Spur Pipeline 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 CO₂ to As Low As Reasonably Practicable (ALARP).

Many of the risks identified and managed eliminate or reduce the risk of a major accident (and therefore environmental consequence).

The Pipelines Safety Regulations 1996 (HM Government, 1996)

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

13.2.12. CO₂ (in gaseous phase) conveyed by the Padeswood Spur Pipeline 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, Operational and Maintenance Stages of the Padeswood Spur Pipeline Proposed Development.

The Environmental Protection Act 1990 (HM Government, 1990)

13.2.13. The purpose of this Act is to ensure that appropriate measures are implemented to reduce the likelihood of pollution to the environment.

Management arrangements during construction, operation, maintenance and decommissioning of the Padeswood Spur Pipeline Proposed Development will be implemented to prevent pollution.

Management of Health and Safety at Work Regulations 1999 (HM Government, 1999)

13.2.14. The purpose of these Regulations is to reinforce employer's duties to manage health and safety and to apply this to all work activities. The Regulations outline the principle of risk-based assessment and highlight that this approach provides the cornerstone for the management of health and safety. The Regulations require that all employers undertake risk assessments.

13.2.15. Appropriate risk assessments and management arrangements will be produced/implemented during the construction, operation,

maintenance and decommissioning of the Padeswood Spur Pipeline Proposed Development.

POLICY

National

13.2.16. The following national policy documents are relevant to the MA&D assessment:

National Planning Policy Framework (NPPF) 2023 (HM Government, 2023)

13.2.17. The NPPF sets out the Government's planning policies for England and how these should be applied, with the following paragraphs relating to MA&D:

- Paragraph 45 states “Local planning authorities should consult the appropriate bodies when considering applications for the siting of, or changes to, major hazard sites, installations or pipelines, or for development around them”.
- Paragraph 97 states: “Planning policies and decisions should promote public safety and take into account wider security and defence requirements by:
 - a) anticipating and addressing possible malicious threats and natural hazards, especially in locations where large numbers of people are expected to congregate. This includes appropriate and proportionate steps that can be taken to reduce vulnerability, increase resilience and ensure public safety and security; and
 - b) recognising and supporting development required for operational defence and security purposes and ensuring that operational sites are not affected adversely by the impact of other development proposed in the area”.

Overarching National Policy Statement for Energy (EN-1) (Department for Energy Security and Net Zero, 2023)

13.2.18. This Overarching National Policy Statement for Energy (EN-1) is part of a suite of NPS designated by the Secretary of State of DESNZ in January 2024. Paragraph 4.13.7 includes reference to the need to “*prevent, control and mitigate major accidents*”.

Future Wales - The National Plan 2040 (Welsh Government, 2021)

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

Planning Policy Wales 2024 (Welsh Government, 2024)

13.2.20. 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.

Local

13.2.21. The following local policy document is relevant to the MA&D assessment:

- Flintshire Local Development Plan 2015-2030. Adopted January 2023 (Flintshire County Council, 2023).

GUIDANCE

National

13.2.22. 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 (Institute of Environmental Management & Assessment, 2020).
- Guidelines for Environmental Risk Assessment and Management (Department for Environment, Food & Rural Affairs, 2011).
- Guideline – Environmental Risk Tolerability for COMAH Establishments (Chemical and Downstream Oil Industries Forum, 2013).
- ISO 31000: 2018 Risk Management – Guidelines (International Standards Organisation, 2018).

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

- The Cabinet Office National Risk Register (2025 Edition) (HM Government, 2025).
- The International Federation of Red Cross & Red Crescent Societies Early Warning, Early Action (The International Federation of Red Cross and Red Crescent Societies, 2021).
- The International Disaster Database (Centre for Research on the Epidemiology of Disasters, 2021).

13.3. SCOPING OPINION AND CONSULTATION

RESPONSE TO THE SCOPING OPINION

13.3.1. An EIA Scoping Opinion was received by the Applicant from the Local Planning Authority (LPA) on 8 May 2024, including formal responses from Statutory Consultees. The responses from the LPA in relation to MA&D and how these requirements should be 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 Padeswood Spur Pipeline 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 (Document Reference: PW.3.2.5)** of this ES.

13.4.2. This section provides an update to the scope of the assessment and reiterates the evidence base for scoping out elements following further iterative assessment.

ELEMENTS SCOPED OUT OF THE ASSESSMENT

13.4.1. The MA&D event types to which the Padeswood Spur Pipeline 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 (Document Reference: PW.3.3.13.1)**. Those major event types which have been scoped out have not been included within this Chapter or considered within this assessment.

13.4.2. Receptors that have been excluded from the assessment, are set out in **Table 13-1** below for the reasons described.

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	Employer's commitment and obligations to manage risks to employees are addressed in the Health and Safety at Work etc

Padeswood Spur Pipeline Proposed Development.	Act 1974 (HM Government, 1974).
Members of the public who are wilfully trespassing, for example, a breach of the Padeswood Spur Pipeline Proposed Development perimeter fencing.	Outside the occupier's legal requirements under the Occupiers' Liability Act 1984 (HM Government, 1984).

ELEMENTS SCOPED INTO THE ASSESSMENT

- 13.4.3. The Long List of potential major accident(s) and/or disaster(s) events provided in Appendix 13.1: **Major Accidents and Disasters Long List (Document Reference PW.3.3.13.1)** identifies and describes those Major Event Types which have been scoped out and those that have been scoped in requiring further assessment. The scoped in Major Event Types for each stage of the Padeswood Spur Pipeline Proposed Development are summarised in the following sections. The assessment of each of the scoped in Major Event Types is presented in **Appendix 13.2: ES Risk Record (Document Reference: PW.3.3.13.2)**.

Construction Stage

- 13.4.4. The Padeswood Spur Pipeline Proposed Development is potentially vulnerable to the following major event types during the Construction Stage, and they have therefore been considered within this assessment:
- Mines and storage caverns;
 - Electricity failure; Gas failure; and
 - Unexploded ordnance (UXO).

Operation Stage

- 13.4.5. The Padeswood Spur Pipeline Proposed Development is potentially vulnerable to the following major event types during the Operational Stage, and they have therefore been considered within this assessment:
- Mines and storage caverns;
 - Fires; and
 - Air pollution.

- 13.4.6. The Long List in **Appendix 13.1: Major Accidents and Disasters Long List (Document Reference: PW.3.3.13.1)** provides the justification for the inclusion of these major event types in the assessment.

13.5. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

KEY DEFINITIONS

13.5.1. The definition of key terms used in this technical chapter are provided in

13.5.2.

Table 13-2 below. These definitions have been developed by reference to the definitions used in EU and UK legislation and guidance relevant to major accidents and/or disasters (HM Government, 2015), (HM Government, 1996), (Department for Environment, Food & Rural Affairs, 2011), (European Parliament, 2012), (The International Federation of Red Cross and Red Crescent Societies, 2021), (HM Government, 2009), (Health and Safety Executive, 2015), (COMAH Competent Authority, 2016) as well as professional judgement in the context of the Padeswood Spur Pipeline Proposed Development.

Table 13-2 - MA&D Key Definitions

Term	Definition
(Major) Accident	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 appointed contractor(s) 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.
Adaptive Capacity	The capacity of receptors to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.
ALARP	"ALARP" stands for "as low as reasonably practicable". Reasonably practicable involves weighing a risk against the trouble, time and money needed to control it. Thus, ALARP describes the level to which the Health & Safety Executive (HSE) expects to see workplace risks controlled.
Consultation Zone	The 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 and is the area within which there could be potentially significant consequences from major accidents to people (or to the environment). The Local Planning Authority is notified of this CD and has a statutory duty to consult the HSE on certain proposed schemes within the zone the CD forms.
Disaster	A naturally occurring phenomenon such as an extreme weather event (for example storm, flood, temperature) or ground-related hazard events (for example subsidence, landslide, earthquake) with the potential to cause an event or situation that meets the definition of a Major Accident as defined above.

Term	Definition
External Influencing Factor	A factor that occurs beyond the limits of the Padeswood Spur Pipeline Proposed Development that may present a risk to the Padeswood Spur Pipeline Proposed Development, e.g., if an external disaster occurred (e.g. earthquake, COMAH site major accident) it will increase the risk of serious damage to an environmental receptor associated with the Padeswood Spur Pipeline 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 that occurs within the limits of the Padeswood Spur Pipeline Proposed Development that may present a risk to the Padeswood Spur Pipeline Proposed Development.
Magnitude of Impact	The magnitude of an impact is typically defined by the following factors: <ul style="list-style-type: none"> • extent – the area over which an effect occurs; • duration – the time for which the effect occurs; • frequency – how often the effect occurs; and • severity – the degree of change relative to existing conditions.
MA&D Group	A MA&D which can be grouped as either a Natural Hazard (Disaster) or Technological or Manmade Hazard (Major Accident).
MA&D Category	A set of values used to categorise events within a related parent MA&D Group.
MA&D Type	A set of values used to sub-categorise events within a MA&D Category.
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 Padeswood Spur Pipeline Proposed Development and has the potential to be a Major Accident and/or Disaster subject to assessment of its potential to result in a significant adverse effect on an environmental receptor.

Term	Definition
Sensitivity	<p>The sensitivity of a receptor is a function of its value, and capacity to accommodate change reflecting its ability to recover if it is affected. It is typically defined by the following factors:</p> <ul style="list-style-type: none"> • adaptability – the degree to which a receptor can avoid, adapt to or recover from an effect. • tolerance – the ability of a receptor to accommodate temporary or permanent change. • recoverability – the temporal scale over and extent to which a receptor will recover following an effect.
Vulnerability	<p>In the context of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (HM Government, 2017) (on the assessment of the effects of certain public and private projects on the environment), the term refers to the 'exposure and resilience' of the Padeswood Spur Pipeline Proposed Development to the risk of a MA&D. Vulnerability is influenced by sensitivity, adaptive capacity and magnitude of impact.</p>

13.6. STUDY AREA

13.6.1. Major accident(s) and/or disaster(s) types have been considered both within and outside the Red Line Boundary along with potential internal and external influencing factors.

13.6.2. At the Scoping Stage, 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);
 - Control of Major Accident Hazard facilities within 3 km (distance to furthest COMAH installation centre point whose Consultation Zone (CZ) overlaps the Padeswood Spur Pipeline Proposed Development);
 - Nuclear installations within 3 km (distance to The Land Use Planning Outer CZ);

- Major accident hazard (MAH) pipelines within 1 km (distance to furthest MAH pipeline whose CZ overlaps the Padeswood Spur Pipeline Proposed Development);
 - Fuel retail sites within 1 km (including Liquefied Natural Gas and Liquefied Petroleum Gas);
 - Rail infrastructure within 500 m; and
 - Transmission (gas, electrical, oil/fuels) crossing the Red Line 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).

13.6.3. The internal and external influencing factors, which may have high adverse consequences on the Padeswood Spur Pipeline Proposed Development, were reviewed for the varying distances identified in **paragraph 13.5.2**, above. As presented at the Scoping Stage, it was identified that the key influencing external factors (such as mines and storage caverns, industrial fires and UXO) were within a 600 m corridor along the Padeswood Spur Pipeline Proposed Development. Therefore, the extent of the Study Area used for the MA&D assessment has been reduced to 600 m.

METHOD OF BASELINE DATA COLLECTION

Desk Study

13.6.4. A desk-based assessment has been undertaken to collate baseline data within the 600 m Study Area. This information has been collated from the following sources to support the identification of potential MA&D:

- The Cabinet Office National Risk Register (2025 Edition) (HM Government, 2025);
- The International Federation of Red Cross & Red Crescent Societies Early Warning, Early Action (The International Federation of Red Cross and Red Crescent Societies, 2021);
- The International Disaster Database (Centre for Research on the Epidemiology of Disasters, 2021);
- HSE COMAH 2015 Public Information (Health and Safety Executive, 2025); and
- ES Chapters and Appendices: **Chapter 6: Air Quality (Document Reference: PW.3.2.6)**, **Chapter 7: Climate Resilience (Document**

Reference: PW.3.2.7), Chapter 9: Biodiversity (Document Reference: PW.3.2.9), Chapter 11: Land and Soils (Document Reference: PW.3.2.11), Chapter 15: Population and Human Health (Document Reference: PW.3.2.15), Chapter 16: Traffic and Transport (Document Reference: PW.3.2.16), Chapter 17: Water Resources and Flood Risk (Document Reference: PW.3.2.17), Chapter 18: Combined and Cumulative Effects (Document Reference: PW.3.2.18), and the OEMP (Document Reference PW.4.1).

Site Visits and Surveys

- 13.6.5. No specific site visits or surveys have been undertaken as part of the assessment of the vulnerability of the Padeswood Spur Pipeline Proposed Development to MA&D.

IMPACT ASSESSMENT METHODOLOGY

- 13.6.6. To date, there is no specific guidance on how to consider MA&D within the context of EIA. However, the assessment takes account of the following emerging EIA good practice:
- EIA Quality Mark Article: What is this MADness? (AMEC, 2017);
 - EIA Quality Mark Article: Major Accidents and Disasters in EIA (Temple Group, 2018);
 - Disasters in EIA (TUV SUD, 2018); and
 - IEMA Major Accidents and Disasters in EIA Guide (Institute of Environmental Management & Assessment, 2020).
- 13.6.7. In addition, other relevant documentation, including the Cabinet Office's National Risk Register (HM Government, 2025) has been considered.
- 13.6.8. The assessment of MA&D has been achieved through a review of available documentation including Front-End Engineering Design (FEED) hazard identification studies and regulatory requirements. It should be noted that the assessment does not involve evaluation from 'first principles', given that existing health and safety legislation already identifies risks and control measures to protect human beings and the environment.
- 13.6.9. The assessment presents any identified risks and considers whether these are managed to be ALARP or whether further mitigation actions (beyond those already integrated into the design) are required for the Padeswood Spur Pipeline Proposed Development.
- 13.6.10. 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, the likelihood of these consequences occurring, considering design progression and embedded mitigation, and the acceptability of the subsequent risk to the relevant receptor (as presented in **Appendix 13.2: ES Risk Record (Document Reference: PW.3.3.13.2)**). The following process has been applied to each of the included MA&D categories and are described further in **Appendix 13.3: MA&D Impact Assessment Methodology (Document Reference PW.3.3.13.3)**:

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

SIGNIFICANCE CRITERIA

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

ASSUMPTIONS AND LIMITATIONS

- 13.6.12. The assumptions and limitations for this assessment are detailed below:
- The design of the Padeswood Spur Pipeline Proposed Development and its implementation is guided by 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 of the Padeswood Spur Pipeline Proposed Development will be managed through the implementation of the Construction Phase Plan (required under the CDM Regulations 2015 (HM Government, 2015). An Outline Environmental Management Plan (OEMP) (**Document Reference PW.4.1**). will be prepared and will include the mitigation relied upon to manage the environmental impacts of the Padeswood Spur Pipeline Proposed Development. A detailed Construction Environmental Management Plan (CEMP) will be prepared by the Construction Contractor post consent.
 - 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 Padeswood Spur Pipeline 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 and Construction (EPC) contractor(s) and the Operation of the Padeswood Spur Pipeline 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.
- In accordance with good environmental and safety management principles, 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.

13.7. BASELINE CONDITIONS

13.7.1. The baseline relevant to this topic comprises:

- Features external to the Padeswood Spur Pipeline Proposed Development that contribute a potential source of hazard to it (see **Appendix 13.1: Major Accidents and Disasters Long List, Document Reference: PW.3.3.13.1**);
- Sensitive receptors at risk of significant effect (see **Section 13.8**); and
- Current (without the Padeswood Spur Pipeline Proposed Development) MA&D risks for the existing locality (see **Appendix 13.1: Major Accidents and Disasters Long List, Document Reference:PW.3.3.13.1**).

Existing Baseline

13.7.2. Major accident(s) and/or disaster(s) risks relevant to the existing baseline include, inter alia, ground stability associated with historical mining activities (as assessed in **Appendix 13.1: Major Accidents and Disasters Long List, Document Reference: PW.3.3.13.1**). Existing baseline conditions are described in detail in the following Technical Chapters:

- **Chapter 6: Air Quality (Document Reference: PW.3.2.6)**;
- **Chapter 7: Climate Resilience (Document Reference: PW.3.2.7)**;
- **Chapter 9: Biodiversity (Document Reference: PW.3.2.9)**;

- Chapter 11: Land and Soils (Document Reference: PW.3.2.11);
- Chapter 15: Population and Human Health (Document Reference: PW.3.2.15);
- Chapter 16: Traffic and Transport (Document Reference: PW.3.2.16);
- Chapter 17: Water Resources and Flood Risk (Document Reference: PW.3.2.17);
- Chapter 18: Combined and Cumulative Effects (Document Reference: PW.3.2.18); and
- OEMP (Document Reference: PW.4.1).

Future Baseline

13.7.3. The future baseline is not anticipated to differ significantly from the current baseline with regards to the vulnerability of the Padeswood Spur Pipeline Proposed Development to the risk of MA&D.

13.8. SENSITIVE RECEPTORS

13.8.1. In line with Regulation 4(2) of The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (HM Government, 2017), the following sensitive receptors were considered with respect to major accident(s) and/or disaster(s):

- 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.

13.8.2. The specific potential receptors of effects resulting from major accident(s) and/or disaster(s) are reported in the relevant ES Chapters.

13.9. DESIGN DEVELOPMENT, IMPACT AVOIDANCE AND EMBEDDED MITIGATION

13.9.1. The Applicant has and will continue to identify opportunities for embedded mitigation as part of the design to reduce the vulnerability of the Padeswood Spur Pipeline Proposed Development to the risk of MA&D. Confirmed embedded mitigation measures include a programme of hazard studies together with engineering / design and procedural operational controls to produce a safe design and to ensure residual risks are managed to be ALARP.

13.9.2. Additional mitigation measures are outlined in **Section 13.11** below and specific mitigation measures have been presented in **Appendix 13.2: ES Risk Record** (document reference PW.3.3.13.2).

13.10. ASSESSMENT OF VULNERABILITY TO THE RISK OF MAJOR ACCIDENTS AND DISASTERS

13.10.1. This section details the output of the assessment of the vulnerability of the Padeswood Spur Pipeline Proposed Development to the risk of MA&D Events, taking account of the mitigation measures detailed in **Sections 13.9** and **13.11**. All events that have been considered are set out in **Appendix 13.2: ES Risk Record (Document Reference: PW.3.3.13.2)**.

13.10.2. MA&D Events to which the Padeswood Spur Pipeline Proposed Development may be vulnerable during construction, operation, maintenance and decommissioning are summarised below.

CONSTRUCTION AND DECOMMISSIONING STAGE

13.10.3. Two MA&D Events have been identified to which the Padeswood Spur Pipeline Proposed Development may be vulnerable during the Construction and Decommissioning Stage as detailed in **Table 13-3** below. All events that have been considered are set out in **Appendix 13.2: ES Risk Record (Document Reference: PW.3.3.13.2)**.

Table 13-3 Potential MA&D Events during Construction grouped by High Level Risk Event

Risk Record Entry Number	Location	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event did Occur
3	Route wide	Striking of known underground services/ utilities (electricity and natural gas).	Harm to people.	Fire and/or explosion affects neighbouring property and/or members of the public.

Risk Record Entry Number	Location	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event did Occur
4	Route wide	Striking of unknown underground services/ utilities (electricity and natural gas) due to inaccurate records.	Harm to people.	Fire and/or explosion affects neighbouring property and/or members of the public.

13.10.4. Based on the assumptions and mitigation measures (presented in **Appendix 13.2: ES Risk Record, Document Reference: PW.3.3.13.2**) put forward in other relevant ES Chapters along with **Sections 13.9 above and 13.11 below**, it is considered that the identified potential major accident(s) and/or disaster(s) events detailed above will be managed to be ALARP.

OPERATIONAL STAGE

13.10.5. Four MA&D Events have been identified to which the Padeswood Spur Pipeline Proposed Development may be vulnerable during the Operational Stage as detailed in **Table 13-4** below. All events that have been considered are set out in **Appendix 13.2: ES Risk Record (Document Reference: PW.3.3.13.2)**.

Table 13-4 Potential MA&D Events during Operation grouped by High Level Risk Event

Risk Record Entry Number	Location	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event did Occur
2	Route wide	Collapse of mine workings causing damage to pipeline leading to loss of pipeline CO ₂ inventory.	Fire and/or explosion or release of harmful gas.	CO ₂ toxicity and fogging hazard affects neighbouring property and/or those people in the affected area.

Risk Record Entry Number	Location	Risk Description	Risk Event (High Level)	Reasonable Worst Consequence if Event did Occur
9	Route wide	Damage to AGI / equipment / pipeline which could potentially lead to a loss of containment 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 affected area.
10	Padeswood AGI	Damage to AGI equipment, as a result of a fire and/or explosion at the Padeswood Cement Works, which could potentially lead to a loss of containment 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 affected area.
11	Route wide	Release of CO ₂ resulting from a loss of containment event involving the CO ₂ 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 affected area.

13.10.6. Based on the assumptions and mitigation measures (presented in Appendix 13.2: ES Risk Record, Document Reference: PW.3.3.13.2) put forward in other relevant ES Chapters along with Sections 13.9 above and 13.11 below, it is considered that the identified potential major accident(s) and/or disaster(s) events detailed above will be managed to be ALARP.

13.11. MITIGATION AND ENHANCEMENT MEASURES

13.11.1. This Section sets out the additional avoidance, mitigation and compensation measures which are likely to be required to address the vulnerability of the Padeswood Spur Pipeline Proposed Development to the risk of MA&D events as assessed in **Section 13.10**.

13.11.2. The measures outlined below and the specific mitigation measures which are detailed in **Appendix 13.2: ES Risk Record (Document Reference: PW.3.3.13.2)** are embedded mitigation measures which will be in place for the construction and operation of the Padeswood Spur Pipeline Proposed Development to ensure that any potential MA&D Events are managed to be ALARP. **Appendix 13.2: ES Risk Record (Document Reference: PW.3.3.13.2)** provides details of mitigation measures for each potential MA&D event identified.

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

- Programme of hazard studies, development and implementation of engineered and procedural controls (including prevention, detection control measures and systems to allow the safe isolation and shutdown of the pipeline system) to produce a safe design and to ensure residual risks are managed to be ALARP as required by health and safety legislative drivers;
- Compliance with all relevant applicable codes and standards for pipeline design and operation
- Environmental, Health & Safety Management systems;
- Manage all construction risks in accordance with the CDM Construction Phase Plan (HM Government, 2015);
- Supplier management environmental, health and safety standards (for example, Construction Skills Certification Scheme);
- Risk management systems; and
- Construction and Environmental Management systems including the CEMP and provisions required under the CDM regulations.

13.11.4. No further design, mitigation or enhancement measures have been identified as being required to mitigate any significant effects arising from the vulnerability of the Padeswood Spur Pipeline Proposed Development to the risk of MA&D Events.

13.12. RESIDUAL EFFECTS

13.12.1. Based on the assumptions and mitigation measures put forward in other relevant ES Chapters and **Sections 13.9** and **13.11** above, it is considered that the identified potential MA&D events identified during the Construction, Operation and Decommissioning Stages will all be managed to be ALARP.

13.13. IN-COMBINATION CLIMATE CHANGE IMPACTS

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

13.13.2. The potential MA&D events that have been considered within this Chapter have been assessed against likely climate hazards, as set out within **Chapter 7 – Climate Resilience (Document Reference: PW.3.2.7)**, and the vulnerability of the Padeswood Spur Pipeline Proposed Development to the risk of MA&D events identified, are not anticipated to change because of these hazards.

13.14. MONITORING

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

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