CONTENTS

TABLES

13 MAJOR ACCIDENTS AND DISASTERS

13.1 Introduction

13.1.1 This chapter will assess the likely significant effects from major accidents or disasters as a result of the construction and operation of the Proposed Development.

13.1.2 As discussed in the introductory sections of the draft Environmental Statement, the Carbon Capture Plant is intended to operate for as long as the existing operational cement works, and therefore decommissioning is not proposed until the ultimate decommissioning of the cement works site. However, as per the request in PEDW's Scoping Direction to consider decommissioning effects, a brief consideration is provided in the event that decommissioning on an earlier timescale were to be required.

13.1.3 The majority of the effects associated with decommissioning would be similar in nature to, but at a reduced scale to construction phase effects. There would be fewer materials, plant, labour and vehicles required during decommissioning when compared to construction. Decommissioning would take place over a shorter duration, and activities would be focused on areas of the Site which at that point would already be developed. Consequently the magnitude and significance of effects associated with decommissioning would not differ in nature from nor exceed those assessed elsewhere in this chapter in respect of construction. It is therefore not considered necessary to provide a separate detailed assessment of decommissioning related effects.

13.1.4 Decommissioning, if required, would be conducted in accordance with the regulatory and policy environment in place at the time with all required permits and consents being obtained prior to commencement.

13.1.5 This chapter is intended to be read as part of the wider draft Environmental Statement, with particular reference to the relevant parts of the following chapters:

- **Volume 2, Chapter 5: Biodiversity** in relation to the presence and value of habitats and species of conservation importance;
- **Volume 2, Chapter 6: Air Quality** in relation to airborne gases and particulates;
- **Volume 2, Chapter 7: Climate** in relation to extreme weather events and temperatures;
- **Volume 2, Chapter 11: Traffic and Transport** in relation to an increase in vehicle movements and associated accident risks;
- **Volume 2, Chapter 12: Land and Soils** in relation to contaminated soils; and
- Carbon Capture and Storage Project – Padeswood, North Wales Flood Consequences Assessment in relation to flood risk.

13.1.6 Regulation 4 (3) of the EIA Regulations[1] establishes that an EIA should cover:

"(3)(b) the expected effects deriving from the vulnerability of the proposed development to risks of major accidents and disasters that are relevant to that development."

13.1.7 There is no statutory guidance for the consideration of major accidents and disasters in an EIA context; however, the Institute of Environmental Management and Assessment (IEMA) provides guidance based on current practice in the UK through the guidance titled Major Accidents and Disasters in EIA: A Primer (2020)[2] hereafter referred to as IEMA 2020. Major accidents and disasters relate to extreme events that would not reasonably be predicted or assessed within the other environmental factors of an EIA. The following definitions (IEMA 2020) have been applied:

- A 'major accident' is defined as an event that threatens immediate or delayed serious environmental effects to human health, welfare and/or the environment and requires the use of resources beyond those of the applicant or its appointed representatives to manage. Whilst malicious intent is not accidental, the outcome (e.g. train derailment) may be the same and therefore many mitigation measures will apply to both deliberate and accidental events;
- A 'disaster' is defined as a natural hazard (e.g. earthquake) or a man-made/external hazard (e.g. act of terrorism) with the potential to cause an event or situation that meets the definition of a major accident;
- 'Risk' is defined as the likelihood of an impact occurring, combined with the effect or consequence(s) of the impact on a receptor if it does occur;
- A 'risk event' is defined as an identified, unplanned event, which is considered relevant to the development and has the potential to result in a major accident and/or disaster, subject to assessment of its potential to result in a significant adverse effect on an environmental receptor;
- For an accident to be considered 'major', this is defined as an occurrence leading to a loss of life or serious danger to human health and/or the environment, whether immediately or over time, onsite or off-site;
- 'Serious danger to human health' relates to people present permanently or for prolonged periods of time in the potentially affected area but excludes workers operating the facility. Injuries leading to disability or prolonged states of ill health shall count as serious dangers to human health; and
- 'Serious danger to the environment' relates to a contaminant source strength that does not decrease significantly within a short time, permanent or long-lasting environmental damage and the affected environment not being restored through minor clean-up and restoration efforts.

13.1.8 Whilst the IEMA definition of a 'serious danger to human health' listed in **Paragraph 13.14.4** excludes workers operating a facility, temporary and permanent workers onsite have been included in the scope of this assessment as the nature of a major accident or disaster is such that it is unpredictable and therefore it will not typically be

[1] https://www.legislation.gov.uk/uksi/2017/571/contents/made

[2] https://www.iema.net/download-document/48915

possible to accurately predict if any additional people will be in the vicinity should an event occur.

13.1.9 In considering the potential for likely significant effects from the Proposed Development resulting from accidents and disasters, it is important to note that the UK already has an existing, structured framework of risk management and safety legislation in place covering the vulnerability of infrastructure and other built development to major accidents and disasters, as summarised in **Table 13.2**.

13.1.10 In most circumstances, the required procedures and mitigation put in place through this legislative framework are sufficient, without the need to implement additional (secondary) mitigation. Vulnerability to major accidents and/or disasters for infrastructure and other built environment developments is covered by a wide range of other safety and non-safety-related legislation.

13.1.11 As per Regulation 4 (4)[3], the consideration of potential risks and vulnerabilities is limited to relevant and/or plausible risks. Therefore this assessment will only consider relevant risks and vulnerabilities for the Proposed Development and will not therefore assess irrelevant risks.

[3] https://www.legislation.gov.uk/uksi/2017/571/contents/made

13.2 Consultation

Consultation undertaken to date

13.2.1 As detailed in **Volume 2, Chapter 5: Approach to EIA**, the Scoping Report proposed to scope major accidents and disasters out the of the EIA as it was considered that the implementation of recognised and approved safety legislation and regulations would be sufficient to manage vulnerabilities to major accidents and/or disasters without the need for secondary mitigation in most circumstances.

13.2.2 **Table 13.1** provides a summary of the PEDW scoping opinion responses relevant to major accidents and disasters.

Table 13.1 Summary of relevant scoping opinion responses

Consultee	Key matters raised	Actions in response to consultee comments
Planning and Environment Decisions Wales (PEDW)	PEDW agrees with NRW's comments and therefore Major Accidents and disasters is scoped in the ES.	Likely significant effects as a result of the construction and operation of the Proposed Development have been assessed within this chapter. This includes direct consideration of losses of carbon dioxide containment in line with Natural Resources Wales and Planning and Environment Decisions Wales' EIA Scoping response.
Natural Resources Wales	We note that Chapter 5.6 of the Scoping Report confirms that major accidents and disasters (MA&Ds) have been scoped out of the Environmental Statement on the assumption that these will all be managed to be as low as reasonably practical (ALARP). However, we do not consider it appropriate at this early stage to scope out MA&Ds from the Environmental Statement and advise that the risk assessment includes the impact of major losses of containment of carbon dioxide and how significant adverse environmental effects would be prevented or mitigated, including details of emergency preparedness.	

13.2.3 Based on the scoping opinion, an assessment of potential significant effects as a result of potential major accidents and disasters has been undertaken as part of the EIA.

13.3 Guidance and legislation

Planning Policy

13.3.1 There is no planning policy that directly relates to Major Accidents or Disasters. However, Planning Policy Wales (2024) has a recurring theme that places and communities should be safe and promote healthy lifestyles. Removing or minimising the potential risks of major accidents or disasters accords with this theme.

Applicable guidance

13.3.2 The following guidance document has been used during the preparation of this chapter:

- IEMA Major Accidents and Disasters in EIA: A Primer (September 2020)[4].

13.3.3 In line with the IEMA Primer (2020), the following are excluded from the scope of the major accidents and disasters assessment:

- "High likelihood events with the potential for high consequences" have not been assessed on the basis that such events are "unacceptable for any development" and that "these should already be managed or designed-out" of the Proposed Development. The construction and operational processes of the Proposed Development must conform to the relevant design and safety standards, and any environmental permits or licenses, in order to prevent high likelihood, high consequence events from happening or to reduce the risk of occurrence to a level that will not result in a significant effect; and
- "Low-impact events whatever the likelihood, such as minor spills, are low risk and are unlikely to be considered a major accidents and/or disasters risk. These events would not threaten immediate or delayed serious environmental effects to human health, welfare and/or the environment."

13.3.4 Therefore, this chapter assesses the reasonably foreseeable, unplanned events that have a low likelihood of occurring, but have the potential for high consequences (i.e. a likely significant effect). It focuses on determining the tolerability of the identified risks, taking into account embedded and additional mitigation measures.

Relevant legislation

13.3.5 The applicable legislative framework is summarised in **Table 13.2.**

[4] https://www.iema.net/download-document/48915

Table 13.2 Legislation, policy and guidance relevant to Major Accidents and Disasters.

Document	Summary
Health and Safety at Work etc. Act 1974[5]	This is the primary legislation governing occupational health and safety. It provides the framework for regulating industrial health and safety in the UK. The key requirement is that foreseeable risks to those in the workplace must be reduced as far as is reasonably practicable and that adequate evidence is provided to demonstrate this.
The Planning (Hazardous Substances) Regulations 2015[6]	Implements land use planning requirements under the Seveso III Directive on the Control of Major Accident Hazards (see below).
Seveso III Directive (Directive 2012/18/EU)[7]	Establishes the rules for the control of major-accident hazards involving dangerous substances for the prevention of major industrial accidents involving hazardous substances and for limiting the consequences of such accidents for human health and the environment. Seveso-III is implemented in national legislation and is enforced by national safety authorities.
Construction (Design and Management) Regulations 2015 (the CDM Regulations)[8]	Places specific duties on developers, contractors and designers to ensure that health and safety is taken into account throughout the life of a construction project. Designers are required to take account of the general principles of prevention and any pre-construction information. This to eliminate the foreseeable risks to the health or safety of any person carrying out or likely to be affected by construction work, maintaining or cleaning a structure, or using a structure designed as a workplace.
The Management of Health and Safety at Work Regulations 1995[9]	More detailed provisions made under the Health and Safety at Work etc. Act 1974, requiring employers to manage health and safety, including carrying out risk assessments and providing appropriate training for employees.
The Workplace (Health, Safety and Welfare) Regulations 1992[10]	Provides for a wide range of basic health, safety and welfare issues applicable to most workplaces (except those involving construction work on construction sites or those below ground at a mine). It sets out duties for providing appropriate

[5] https://www.legislation.gov.uk/ukpga/1974/37/contents

[6] https://www.legislation.gov.uk/uksi/2015/627/contents/made

[7] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32012L0018

[8] https://www.hse.gov.uk/construction/cdm/2015/index.htm

[9] https://www.legislation.gov.uk/uksi/1999/3242/contents/made

[10] https://www.legislation.gov.uk/uksi/1992/3004/contents/made

Document	Summary
	ventilation, lighting, cleanliness, floor conditions and traffic routes.
The Electricity at Work Regulations (1989)[11]	Sets out the precautions to be taken by employers, employees and the self-employed against the risk of death or personal injury from electricity associated with work activities.
The Dangerous Substances and Explosive Atmospheres Regulations (2002)[12]	Governs the control of substances that cause explosions and fires. Sets out requirements for employers to assess and mitigate risks by ensuring the safe storage, handling and use of hazardous materials, along with any appropriate safety measures.
Pipelines Safety Regulations (1996)[13]	Governs the safety of pipelines used for the transportation of substances. Imposes requirements for pipelines to be safe and well-constructed so to prevent any leakage of fugitive gas emissions.
Environmental Permitting Regulations (2016)[14]	Sets out laws to govern various commercial and industrial activities that have the potential to impact the environment. With respect to major accidents and disasters, this piece of legislation ensures the safe handling, storage and disposal of hazardous substances that have the potential to cause damage to human health or the environment.
Civil Contingencies Act (2004)[15]	Establishes a framework for emergency preparedness and response. Imposes a clear set of roles and responsibilities of local authorities whose role it is to respond to emergencies.

13.3.6 The Proposed Development will require a variation to the existing Environmental Permit. The environmental permitting process aims to protect the environment and to ensure best practice in the operation of regulated facilities. Emergency response plans and contingency measures will be a requirement of the Environmental Permit and will account for UK regulatory requirements.

13.4 Baseline conditions

Hazard and major accident risk through existing cement works

[11] https://www.hse.gov.uk/pubns/books/hsr25.htm

[12] https://www.hse.gov.uk/fireandexplosion/dsear.htm

[13] https://www.legislation.gov.uk/uksi/1996/825/contents/made

[14] https://www.legislation.gov.uk/uksi/2016/1154/contents/made

[15] https://www.legislation.gov.uk/ukpga/2004/36/contents

13.4.1 The existing cement works comprise a large and complex network of kilns, crushers, conveyors, mills, storage and packing plant.

13.4.2 The ongoing operation of the existing cement works means there is the potential for hazards to occur through, for example, the risk of fire from malfunction of the kiln fuel and firing systems.

13.4.3 However, in considering the baseline safety procedures, it is important to note that the existing cement works is already subject to a structured framework of risk management and safety legislation which mandate mitigation measures and other safety procedures.

13.4.4 These measures and procedures are in operation at all times and as a result mean there is little chance of a major accident occurring.

13.4.5 There are no other sites nearby which generate any risks or hazards that are likely to lead to an increased risk to the existing cement works.

Documented safety management procedures

13.4.6 The safety management processes for the Proposed Development will be defined in a number of key documents.

13.4.7 Management of construction related impacts will be implemented in accordance with the Outline Construction Environmental Management Plan (OCEMP) being submitted as part of the planning application (**Volume 4, Technical Appendix 2.1**). A Code of Construction Practice (CoCP) will be developed prior to construction starting which will set out the relevant regulatory protocols and good practice guidance to be followed.

13.4.8 For the operational phase of the Proposed Development, the Applicant will extend the existing health, safety and environmental management systems to include the Carbon Capture Plant. The management systems will outline the approach to safety and environmental management during operation, including spill response, emergency response and safe evacuation plans, and will respond fully to the existing UK regulatory requirements. Processes and protocols will cover the following areas:

- Quality control and quality assurance of components in the manufacturing, post-manufacturing handling, construction and commissioning phases, with the aim of managing the risk of fire, explosion or leaks at source by eliminating faulty components from the design;
- Emergency response, whereby previous major industrial fires and explosions have highlighted the need to ensure emergency services have an understanding of what is taking place inside each structure of the Proposed Development without entering them. This comprises practices such as remote monitoring and remote control of CO_2 compression equipment, for example, so avoiding the need for Emergency Service personnel to approach the facility in order to control and contain any fire. Compartmentation, safety distances and containment are key mitigations in the design. The management of any gases or chemical substances that may be emitted from the Proposed

Development and decomposition gases from a fire are likely to be a particular focus;

- Identification of requirements for wet/ water emergency responses, subject to engagement and consultation with the local Fire and Rescue Service. A firewater system is already part of the Proposed Development design in areas where major fires could potentially develop. The effectiveness and efficacy of a wet/ water emergency response will be dependent on factors such as further detailed design and supplier requirements. If deemed effective and necessary, suitable measures to ensure safe remote cooling of any incidents would be established in consultation with the local fire service in the event that other fire control measures have failed; and
- Mitigation by design, whereby the Applicant's Design Risk Management process will provide a robust platform to eliminate risk by good design (i.e. prevention through design where possible, and mitigation to levels that can be shown to be 'as low as reasonably practicable' (ALARP) where elimination is not possible). A Hazard Identification (HAZID) has been completed and a Hazard and Operability Study (HAZOP) will also be completed, ensuring subject matter experts from all stakeholders in the operation and management of the Proposed Development, including emergency situations, will be engaged. Crisis management and continuity plans will be in place, and a layer of protection analysis (LOPA) will also be implemented if necessary. In addition to employing the Design Risk Management Process, the applicant will actively engage with the supply chain and the local Fire and Rescue Service post planning consent (should planning consent be granted), to develop a fire management strategy to ensure all parties are aware of the necessary processes in the event of a fire. Design decisions will be recorded and used within an Active Risk Management system to form a common risk register, which will be developed from concept to implementation.

Surface water and ground water

13.4.9 There are a number of watercourses located within and adjacent to the Site boundary. These include a north-south aligned watercourse running the length of the western boundary, a north-south aligned watercourse running through the north east and eastern section of the Site, and a section of watercourse running from the eastern extent of the existing plant in a south westerly/southern direction. Black Brook lies 325m to the south of the Site boundary. Two ponds/wet areas are located in the southern section of the Site; the pond in the south western corner was a landfill cell and has been non-operational since its creation, and the remaining pond is a works settling pond used to harvest rainwater and store process water for use in the plant.

These ponds are proposed to be re-modelled to provide more effective containment and attenuation of surface water as part of the Proposed Development.

13.4.10 The Proposed Development is not within or close to any source protection zone (SPZs) for groundwater abstraction points.

National and international designated sites

13.4.11 As described in **Volume 2, Chapter 7: Biodiversity**, the Site does not form part of any statutory site for nature conservation. However, there is an active great crested newt (GCN) mitigation licence covering the active areas of the existing cement works.

13.4.12 The following designated sites are located within 2 km of the Site boundary:

- Buckley Claypits and Commons Site of Special Scientific Interest (SSSI); and
- Deeside and Buckley Newt Sites Special Area of Conservation (SAC).

13.4.13 Both are c.900 m from the Site boundary and are designated due to their breeding populations of GCN. There are seven further SACs, Special Protection Areas (SPAs) and Ramsar sites within 10km of the Site boundary, although all are more than 6km away.

13.4.14 The following non-statutory designated sites are located within 2 km of the Site boundary:

- Black Brook Plantation (230 m);
- Bistre Wood (585 m);
- Padeswood Pool (625 m);
- Padeswood Marsh (660 m);
- Padeswood Pasture (710 m);
- Hartsheath (845 m);
- Price's Hill Wood (945 m);
- Coed Bryn Llys and Marsh (995 m);
- Optec Pond (1,020 m);
- Knowl Hill (1,085 m);
- Marleyfield Meadow and Copse (1,100 m);
- Plas Newydd Farm Lake (1,195 m);
- Pontblyddyn Marsh and Coppa Wood (1,200 m); and
- Garth Wood and Hartsheath (1,390 m).

13.4.15 Detailed reasons for designation for all statutory and non-statutory sites are listed in **Table 2** and **Table 3** in **Volume 4, Technical Appendix 5.1** respectively.

Historical buildings and scheduled monuments

13.4.16 As detailed in **Volume 2, Chapter 8: Cultural Heritage**, there are three non-designated historic assets located within the Site boundary:

- Penyffordd cement works, a large modern cement works owned by the Applicant at the time it was recorded;
- A modern football ground near Padeswood Hall; and
- Post Medieval Padeswood Hall and garden.

13.4.17 There are five designated historic assets and 30 non-designated historic assets within 1km of the Site boundary. These are outlined in greater detail in **Volume 2, Chapter 8: Cultural Heritage**.

Rail and road network

13.4.18 The Site is located to the west of the railway line between Wrexham and Deeside.

13.4.19 The A5118 runs parallel to the northern boundary of the Site, where the junction for the main Site access is located. Padeswood Drive, a minor residential road exiting from the A5118, is located within the northern perimeter of the Site. The A5118 links to the A550 to the east, providing a connection to the A55 – North Wales Expressway located approximately 2km to the north.

Human population

13.4.20 There are a number of semi-detached residential dwellings located along Padeswood Drive within the northern portion of the Site boundary. Further residential properties are located on the opposite side of Padeswood Drive to the immediate north of the Site. Various farm holdings are located within the agricultural land surrounding the Site. The residential areas of Penyffordd and Penymynydd are located approximately 250m and 700m respectively to the east of the Site boundary, separated from the Site by the railway line. The residential area of Buckley is located approximately 750m to the north west.

Other infrastructure

13.4.21 There is a sewage treatment works located approximately 1km west of the Site boundary.

Airports and air traffic

13.4.22 Hawarden Airport is located approximately 4.9km north east of the Site boundary.

Future baseline

13.4.23 The existing Site does not give rise to the potential for any major accidents or disasters. In the absence of the Proposed Development, the future baseline of the existing Site is not anticipated to differ significantly from the current baseline with regards to the vulnerability to the risk of major accidents and disasters.

13.5 Assessment approach and methodology

Scope of assessment

Spatial scope

13.5.1 The assessment relates to both activities within the Proposed Development and the potential effects to receptors close to the Site, as this area is where any effects will be focused in the event of an accident or major disaster.

13.5.2 There is no best practice guidance on the extent of study area to be used for the assessment of likely significant effects relating to major accidents and disasters.

13.5.3 Therefore, based on professional judgement an area covering a radius of 3km from the centre of the Site has been chosen as the Study Area. This distance is based on that radius being sufficient to cover the main centres of population local to the Site, including Buckley, Penyffordd and Penymynydd.

13.5.4 Specific receptors considered in the assessment are identified below.

Temporal scope

13.5.5 This assessment covers the construction and operational phases of the Proposed Development. The operational lifetime of the Proposed Development is assumed to be 25 years.

Identification of potential hazards

13.5.6 A review has been undertaken to consider the types of potential hazards most likely to affect the Proposed Development in order to establish if there are any hazards that have the potential to cause a significant effect (i.e. a high consequence event) but with a low likelihood of occurring and which receptors are likely to be affected. This review considered both the risks presented to the Proposed Development by external hazards and the risks presented to receptors by the Proposed Development itself.

External hazards

13.5.7 Major hazard categories and types applicable to the Proposed Development have been considered in the context of those identified in the UK National Risk Register of

Civil Emergencies (Cabinet Office, 2020)[16] and North Wales Community Risk Register[17].

UK National Risk Register

13.5.8 The UK National Risk Register of Civil Emergencies (Cabinet Office, 2020)[18] provides an overview of the key risks that have the potential to cause significant disruption in the UK. These risks include consideration of environmental hazards such as flooding and severe weather, and major industrial accidents.

HAZID Study

13.5.9 A HAZID study was undertaken by the Applicant's Front End Engineering Design contractor in January 2024, the results of which have informed this assessment. This study brought together all key parties with regards to the operation and maintenance of the Proposed Development to consider the existing safety measures and any additional measures that could be implemented. The study considered the following aspects of the Proposed Development:

- Common site infrastructure;
- CHP and waste heat recovery unit;
- Carbon capture unit, CO_2 compression and conditioning (dehydration and oxygen removal);
- Utilities, non-process and off-site systems e.g. roads, control room, off-site maintenance workshop;
- Construction, commissioning and start-up; and
- Future development such as removal of old flue stack and ducting.

13.5.10 A review of the HAZID study was undertaken to consider the potential for hazards to occur as a result of the processes being used during the operational phase of the Proposed Development.

13.5.11 The HAZID study considered the key systems detailed above and lists the likely source of a hazard, the potential cause or initiating event that may lead to a hazard, and then describes the worst case unmitigated consequences as a result of such a hazard occurring and the safeguards or controls embedded within the design process. It also assigns a risk analysis rating to each of the potential consequences: low, medium, high and very high. The risk of a consequence occurring with a 'very high' rating is considered intolerable, requiring immediate cessation of the cause. A

16 https://assets.publishing.service.gov.uk/media/6001b2688fa8f55f6978561a/6.6920_CO_CCS_s_National_Risk_Register_2020_11-1-21-FINAL.pdf

17 https://www.flintshire.gov.uk/en/PDFFiles/Emergency-Planning/68076-NWCRR-A5-Booklet-English.pdf

18 https://assets.publishing.service.gov.uk/media/6001b2688fa8f55f6978561a/6.6920_CO_CCS_s_National_Risk_Register_2020_11-1-21-FINAL.pdf

'high' rating is considered tolerable but risk reduction measures must be in place to reduce that risk as much as is reasonably practicable.

13.5.12 This review has identified that across the key systems listed above and across all potential causes or initiating events, the potential worst case unmitigated consequences fall into four general hazard categories. They are:

- Loss of containment of CO_2;
- A major fire event;
- Major structural failure due to corrosion; or
- A major pollution incident.

13.5.13 There is potential for effects relating to these four hazard categories to occur, which are considered further within this assessment.

Receptors

13.5.14 As outlined in the IEMA Primer (2020), it is important to link the potential risk relating to any receptors that may be affected as a result of a major accident or disaster occurring. Therefore, the receptors that may be affected directly or indirectly by a major accident or disaster, and considered in this assessment, are:

- Human receptors, including:
  - Site workers and site visitors during construction and operation of the Proposed Development;
  - Local residents at nearby properties and settlements/members of the public, within the 3km Study Area;
  - Users of the A5118 highway network and railway; and
  - Emergency personnel attending the Site in the event of a major accident or disaster.
- Environmental receptors, including:
  - Groundwater;
  - Habitats and species on and adjacent to the Site;
  - Surface water including Black Brook; and
  - Air.
- Infrastructure, including:
  - Existing cement works infrastructure and road/rail infrastructure;
  - Sewage treatment plant located approximately 1 km to the west of the Site;
  - Unidentified unexploded ordnance;
  - Air traffic associated with Hawarden airport;
  - Residential properties within the Site boundary on Padeswood Drive; and
  - Three non-designated historic assets within the Site boundary.

Potential major accidents or disasters

13.5.15 A review of the HAZID study, the national risk register and local risk register has been undertaken in **Section 13.6** below. That review has concluded that, whilst unlikely, the following major accidents or disasters are considered those of most relevance to the Proposed Development:

- Fire;
- Structural failure within the Carbon Capture Plant;
- CO_2 release; or
- Pollution event.

13.5.16 These hazards are the focus of the remainder of this chapter. They may be caused by external hazards impacting on plant controls and processes, for example power failure, or caused by the proposed scheme itself impacting internal and/or external receptors, for example disturbance of unidentified unexploded ordnance or corrosion of structures.

Human receptors

13.5.17 In the event of a major fire, explosion, structural failure or spill of toxic substances from within the Proposed Development, including loss of containment of CO_2, there is potential to cause injury (major or minor) or loss of life to staff working at the Proposed Development and to members of the public in close proximity to the Site.

13.5.18 Emergency service crew that may then need to attend site to address such an incident are also at risk from the same such injuries or exposure to substances.

13.5.19 While the internal access roads to and around the Site are private with controlled access, users of the diverted footpath which will run adjacent to the Carbon Capture Plant would be at risk in the event of an uncontrolled fire.

13.5.20 There is potential for indirect effects on nearby settlements due to the dispersal of airborne contaminants released by an event. Emissions from smoke may result in indirect impacts to human health to staff, residents or members of the public. The extent over which such indirect impacts may occur will depend on various factors, particularly fire duration, wind direction and wind strength.

Environmental receptors

13.5.21 Major fires, explosions or spills from within the Proposed Development can have direct impacts resulting in the widespread death of animal populations and damaged or destroyed habitats.

13.5.22 Indirect consequences of such events may be felt as a result of contaminants dispersed by fire extinguishers (water, foam or liquid chemical) entering surface waters, soils and ground water.

13.5.23 Airborne contaminants due to release of gases and ash can lead to indirect impacts on biodiversity in the surrounding area depending on the nature, volume and type of the gas released.

Infrastructure

13.5.24 Major fires and releases of pollutants from within the Proposed Development have potential to directly impact nearby infrastructure such as the existing cement works, nearby residential properties and/or the internal or public road network and the three non-designated historic assets within the Site boundary.

13.5.25 It is possible that aircraft travelling to or from Hawarden Airport may be affected if there were a major fire event. Any aircraft flying over the Proposed Development may have direct interaction with a fire event. Aircraft intending to arrive at or depart the airport may experience delays through effects relating to heat or impaired visibility as a result of the smoke produced during a fire.

Impact assessment criteria

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

Difficulties and uncertainties

13.5.27 The assessment is based on potential accidents or disasters occurring unexpectedly. Therefore it is not possible to quantify who or what might be in the vicinity of a major accident or disaster at any one time or the full nature of the emergency. Therefore a reasonable worst case assumption has been used to ensure that if there are any uncertainties in the information, the level of assessment covers the most severe impacts and effects.

13.6 Assessment of effects

13.6.1 The assessment of effects section of this chapter describes the potential risk of an accident or emergency occurring during the construction and operational phases of the Proposed Development.

13.6.2 The assessment of effects is presented in **Table 13.3** as a risk assessment matrix, based on that provided at Appendix D of the IEMA Primer (2020). In accordance with that guidance, the requirement for further assessment is focused on low risk, high consequence events.

Risks from the National Risk Register

13.6.3 A review of the National Risk Register has identified that most of the risks listed are irrelevant to the Proposed Development. However, it is plausible that some of the risks identified could become a hazard or lead to a major accident at the Site. **Table 13.3** lists all potentially relevant risks and gives justification for why any further consideration is or is not needed.

Table 13.3 National Risk Register review

Risk	Discussion of risk	Further assessment required?
Malicious Attacks: Cyber attacks	The nature of the plant operation and process is such that the possibility of malicious attack is unlikely to present an additional hazard beyond those otherwise assessed in this chapter. Any effects resulting from a cyber attack would manifest through the same hazards already considered and assessed.	No further assessment required.
Environmental Hazards: Flooding	As per the Flood Consequences Assessment (FCA) prepared for the Proposed Development, included in the planning application documents for the Proposed Development, the Site is located within an area with little or no risk of flooding from rivers, the sea, groundwater, sewers and reservoirs. The FCA reports that there are areas of low to high risk of flooding from the land with sections of the Site located in flood zone 2 and 3. The majority of the area to be developed is classified as very low risk of flooding from the land as per hydrology assessments undertaken for the Proposed Development. The Proposed Development is not expected to lead to an increased risk of surface water flooding.	No further assessment required.
Major Accidents: Widespread electricity failures	The existing site uses uninterruptible power supply (UPS) devices to protect equipment should there be a power failure. In the event of an electrical failure, it is expected that the UPS device(s) will maintain power to equipment and either allow it to continue to operate or allow for a safe shutdown therefore preventing any accident or disaster occurring as a result of electricity failure. The Proposed Development will also utilise a continuous heat and power unit which will give a 'self sufficient' power supply thus reducing the dependency on any mains electricity. UPS systems will also be used to protect equipment in the event of loss of power from both the grid and CHP.	No further assessment required.

Risk	Discussion of risk	Further assessment required?
Major Accidents: System failures	Systems failure is unlikely to present an additional hazard beyond those already assessed in this chapter,	No further assessment required.
Major Accidents: Non nuclear	As outlined above in **Paragraph 13.5.12** and **13.5.15**, a major accident at the Site is most likely to occur as a result of a fire or explosion, a release of CO_2 or as a result of a pollution incident.	Yes, further assessment is required and has been undertaken below in **Section 13.6**.
Major Accidents: Major fires	The risk of a major fire occurring is discussed below in **Section 13.6**.	Yes, further assessment is required and has been undertaken below in **Section 13.6**.
Human and animal health: Pandemics	Pandemics have the potential to impact the health of a large number of people in a short space of time. This may lead to a hazard/risk if there are not enough staff to safely operate the Proposed Development. However, if the workforce is suddenly reduced through large scale illness it is not expected to lead to a safety issue as the processes are automated and can be undertaken by other personnel. The Site continued to operate safely during the Covid 19 Pandemic and so it is expected that this would be the case with any future pandemics.	No further assessment required.

13.6.4 Of the National Risks identified, only the risk of a major fire or non-nuclear major accident occurring will be assessed further in this chapter.

Regional risks – North Wales Preparing for Emergencies

13.6.5 At a regional level, the North Wales Preparing for Emergencies (Community Risk Register) (2020) published by Wales Resilience Forum and included on the Flintshire County Council website at the date of writing this chapter, highlights risks that could impact the North Wales area.

13.6.6 A review of the Community Risk Register has been undertaken and this did not highlight any relevant risks beyond those already considered above at the National

level. Therefore, in line with proportional assessment, these risks will not be considered again.

13.6.7 Additional consideration has been afforded to risk assessment information provided by the applicant, the assessment chapters listed in **Paragraph 13.1.3** above and the Planning, Design and Access Statement in order to identify risks, sensitive receptors and pathways. No further risks have been identified as a result of a review of these documents.

Hazards as a result of the Proposed Development – HAZID study

13.6.8 The HAZID study prepared for the Proposed Development has been reviewed to consider the potential for a major accident or disaster occurring. The HAZID study considered the proposed carbon capture process under the following key aspects of the Proposed Development:

- Common site infrastructure;
- CHP and waste heat recovery unit;
- Carbon capture unit, CO_2 compression and conditioning (dehydration and oxygen removal);
- Utilities, non-process and off-site systems e.g. roads, control room, off-site maintenance workshop;
- Construction, commissioning and start-up; and
- Future development such as removal of old flue stack and ducting.

13.6.9 The review of the HAZID study indicates that the main sources of on-site risk relate to the potential for the following major accidents or disasters during the construction and/or operation of the Proposed Development:

- Loss of CO_2 containment due to equipment failure;
- Fire/explosion or environmental contamination due to equipment failure;
- Injury or death due to disturbance of unidentified unexploded ordnance;
- Structural failure due to the use of corrosive process materials or due to extreme weather events; and
- Environmental contamination due to release of hazardous substances.

13.6.10 These risks are the focus of the remainder of this chapter.

Hazards identified in the HAZID Study

13.6.11 The source/pathway for each of these risks was identified based on the process design of the Proposed Development and are summarised in **Table 13.4.**

Table 13.4 Hazard and source/pathway overview

Hazard type	Construction	Operational Process				
		Flue Gas Handling	Amine process	Water cooling system	CHP	CO_2 handling & compression
Fire/Explosion	Disturbance of unidentified unexploded ordnance during construction, resulting in fire/explosion.	Thermal oil leakages from heat exchanger or storage tank may ignite if not sufficiently cooled. Process failures or malfunctions may result in thermal oil combustion.	Undiluted amine is flammable and thus may cause fire/explosions in the event of leakages.		Natural gas leakages from electricity generation resulting in fire/explosion or potential for ignition from a lightning strike. Incomplete combustion may result in the release of combustible gas creating a flammable atmosphere downstream of CHP.	

Hazard type	Construction	Operational Process				
		Flue Gas Handling	Amine process	Water cooling system	CHP	CO_2 handling & compression
Environmental contamination		Thermal oil spillages from heat transfer process polluting water sources or biodiversity.	Amine spillages may pollute water source or biodiversity.	Reverse osmosis process in water cooling systems may result in environmental contamination via salt-rich osmosis blowdown.	Accidental leaks from inventory may pollute water sources or biodiversity.	
Loss of CO_2 containment					Potential for large release of CO_2 rich kiln gas, creating asphyxiating atmosphere.	Equipment failure or process upsets may result in a large release of CO_2 resulting in asphyxiating atmosphere.
Structural failure		New flue stack will handle treated and untreated flue gas with risk of internal corrosion, with risk of stack collapse.				

Hazard type	Construction	Operational Process				
		Flue Gas Handling	Amine process	Water cooling system	CHP	CO_2 handling & compression
		Potential for increased wind loading on flue stack and absorber column due to climate change.				

13.6.12 **Table 13.4** demonstrates there is a credible pathway for a risk to lead to a hazard in all of the processes identified above and therefore there is the potential for a significant effect.

13.6.13 Therefore, secondary mitigation measures need to be considered relative to the highlighted risks in order to determine if the level of effect after mitigation is significant.

13.7 Mitigation

13.7.1 As noted previously in this chapter, there are a number of existing health and safety documents, plans and practices in place as part of the operation of the existing cement works. For clarity, the mitigation discussed in this section solely relates to new or updated measures that will be introduced during the construction and/or operation of the Proposed Development.

New or updated safety management procedures

13.7.2 Any new or updated safety management processes will be defined in a number of documents. This will include new emergency plans or updates to existing plans that relate to the containment of or sudden/unexpected release of CO_2.

13.7.3 The full list of recommendations in the HAZID report for new or updated safety management procedures will be implemented at the appropriate phase of development. Of particular relevance to this assessment, the following are expected to be completed before construction work begins:

- Review the impact of climate change on wind loading of tall structures and allowances made in the design for the design life of the plant;
- Quantify and model a major CO_2 leak, and update the design to incorporate an impounding basin to the southwest corner of the CHP, with a low level surface channel to direct any CO_2 leaks to a low point and safely retain any gas cloud to prevent further flow downhill before dispersing;
- Conduct an unexploded ordnance survey for the new CHP plant and construction areas; and
- Review the material selection for the new flue gas stack to ensure it can handle both treated and untreated flue gas, reducing the risk of corrosion and structural failure.

<u>Construction phase</u>

13.7.4 The only hazard identified in this assessment that may give rise to a major accident or disaster during the construction phase of the Proposed Development, is the risk of disturbing unidentified, unexploded ordnance. As part of the recommended new and

updated safety management processes outlined above, it is proposed to conduct an unexploded ordnance survey, prior to construction works beginning.

Operational phase

13.7.5 For the operational phase of the Proposed Development, the Applicant will implement mitigation recommendations outlined in the HAZID study. These include the measures listed in **Paragraph 13.7.4**, which relate specifically to those aspects of the operational equipment and processes with the potential to cause a major accident or disaster.

13.7.6 Furthermore, the Applicant will extend the existing health, safety and environmental management systems of the existing cement works to include the Carbon Capture Plant. The management systems will outline the approach to safety and environmental management during operation, including spill response, emergency response and safe evacuation plans, and will respond fully to the existing UK regulatory requirements.

Embedded/Primary mitigation

13.7.7 The design of the Proposed Development will incorporate a series of measures to mitigate the risk of a major accidents and/or disasters from occurring due to external and internal hazards. The measures referred to in this section are anticipated to be secured by the suite of safety related report being completed as part of the Front End Engineering Design process; the relevant documents of which will form part of the Environmental Permit and operating plan for the Proposed Development.

13.7.8 During the operational phase of the Proposed Development, the Applicant will extend the existing health, safety and environmental management systems to include the Carbon Capture Plant. The management systems will outline the approach to safety and environment management respectively during operation, including spill response, emergency response and safe evacuation plans. This will include processes and protocols covering the following areas:

- Quality control and quality assurance of components in the manufacturing, post-manufacturing handling, construction and commissioning phases, with the aim of managing the risk of fire, explosion or leaks at source by eliminating faulty components from the design;
- Emergency response, whereby previous major industrial fires and explosions have highlighted the need to ensure emergency services have an understanding of what is taking place inside each structure of the proposed scheme without entering them. This comprises practices such as remote monitoring and remote control of gasification chambers, for example, so avoiding the need for Emergency Service personnel to approach the facility in order to control and contain any fire. Compartmentation and containment are key mitigations in the design;
- The management of any gases or chemical substances, including CO_2 that may be emitted from the Proposed Development and decomposition gases from a fire are likely to be a particular focus. A risk assessment to consider the risk of a large release of CO_2 will be undertaken prior to grant of

Environmental Permit and this will include modelling of where a CO_2 release might disperse;

- Identification of requirements for wet/water emergency responses, subject to engagement and consultation with the local Fire and Rescue Service. The effectiveness and efficacy of such a response will depend on factors such as further detailed design and supplier requirements. If deemed effective and necessary, suitable measures to ensure safe remote cooling of any incidents would be established in consultation with the local fire service in the event that other fire control measures have failed;
- Mitigation by design, whereby the Applicant's Design Risk Management process will provide a robust platform to eliminate risk by good design (i.e. prevention through design where possible, and mitigation to levels that can be shown to be 'as low as reasonably practicable' (ALARP) where elimination is not possible). Use of the two Hazard Identification (HAZID) reports and a Hazard and Operability Study (HAZOP) will ensure subject matter experts from all stakeholders in the operation and management of the Proposed Development, including emergency situations, will be engaged. Crisis management and continuity plans will be in place. In addition to employing the Design Risk Management Process, the applicant will actively engage with the supply chain and the local Fire and Rescue Service to develop a fire management strategy to ensure all parties are aware of the necessary processes in the event of a fire. Design decisions will be recorded and used within an Active Risk Management system to form a common risk register, which will be developed from concept to implementation;
- Multiple layers of automated safety alerts and controls will be in place. In the event of loss of power or damage to automated systems, procedures for manual shutdown/isolation of plant components will also be in place; and
- Emergency shutdown philosophy has been developed to ensure the plant is quickly and safely shutdown in the event of an emergency.

13.7.9 The following safety process/systems will be in place before the Proposed Development becomes operational:

- Pipeline safety systems;
- Gas/liquid pressure regulators with operational controls and monitoring;
- Pressure relief systems;
- Emergency shutdown valves;
- Gas detection and alarm systems;
- Fire detection and fire protection systems; and
- Embedded fire prevention measures.

13.7.10 Compliance of existing process safety regulations as described in this chapter will continue throughout the operational life of the Proposed Development.

13.8 Residual effects

13.8.1 **Table 13.5** describes the potential hazards as a result of the Proposed Development, the source or pathway leading to an effect on a receptor, the reasonable worst case

scenario for any effects and then the embedded and additional mitigation measures that will be applied. The final column then concludes if the level of risk for each hazard type, once mitigation measures are applied, is as low as reasonably possible.

13.8.2 The risks considered in **Table 13.5** are those highlighted as requiring further consideration in **Section 13.6**.

Table 13.5 Hazard risk matrix

Hazard type	Source and/or pathway	Reasonable worst case consequence	Receptors(s) and project phase	Embedded and additional mitigation	Is the residual level of risk as low as reasonably practicable?
Large release of CO_2	• Loss of CO_2 containment event	• Asphyxiation/fatalities. • CO_2 fogging.	• Human • Environmental • Operational phase only.	• Develop and review current emergency plan to include a release of CO_2. • Conduct a Qualitative Risk Assessment through the Front End Engineering Design beginning with regards to a large release of CO_2 to review the risk to site personnel and members of the public. • Gas detection system complete with an alarm system. • Limited CO_2 volume allowed in compressor. • Ensure correct materials used and maintained regularly in all aspects of CO_2 containment. • Install an impounding basin and low level surface channel to direct any CO_2 leaks to a low point / retain any gas cloud.	Yes. The use of emergency plans and the implementation of the additional mitigation recommended in the HAZID study will ensure that the potential for a large release of CO_2 is minimised to a level that is as low as reasonably possible.
• Fire/explosion	• Presence of combustible materials and	• Fire and/or explosion affects site infrastructure,	• Human • Environmental	• Use of diluted amine (considered to be non-combustible).	Yes. The undertaking of a pre-construction survey, the creation and

Hazard type	Source and/or pathway	Reasonable worst case consequence	Receptors(s) and project phase	Embedded and additional mitigation	Is the residual level of risk as low as reasonably practicable?
	flammable substances such as amine, hydrocarbon fuels, thermal oil, diesel etc. • Presence of chemical mixtures forming toxic gases. • Presence of previously un-identified unexploded ordinance.	neighbouring properties, site workers/visitors and/or members of the public, and local environment. • Toxic fume generation affects site workers/visitors and/or members of the public.	• Infrastructure • Unexploded ordinance during construction phase with other sources during operational phase only.	• A fire risk assessment will be conducted as part of the initial design of each sub-system to ensure suitable safeguards and firefighting measures are implemented to allow control of fire. • Safeguards for control of fires will be reviewed with fire brigade and as part of the fire risk assessment. Safeguards may include spill bays, multiple escape routes, access provisions for fire brigade. • Embedded fire prevention measures include built in water spray systems and combustible air monitoring. • Pre-construction works survey to identify any unexploded ordinance within the Site.	implementation of a fire-risk assessment, fire control and suppression methods alongside consultation with the fire brigade regarding an emergency response plan should mean that the potential for a major fire or explosion is as low as reasonably possible.
Pollution incidents	• Loss of containment of contaminating or hazardous substances.	• Contamination of groundwater or surface water and/or ecological habitats.	• Environmental • Operational phase.	• Spill kits capable of dealing with hydrocarbon and chemical spills and spill response plans. • Spill response for control of pollution incidents, including creation of bunds.	Yes. With implementation of embedded mitigation the risk of a major accident or disaster occurring is as low as reasonably possible.

Hazard type	Source and/or pathway	Reasonable worst case consequence	Receptors(s) and project phase	Embedded and additional mitigation	Is the residual level of risk as low as reasonably practicable?
				• Management of onsite staff and contractors through CDM and health and safety at work regulations. • Best practice control measures will be implemented through a CEMP and CoCP during construction, and through extension of the existing health, safety and environment management systems during operation. • Existing management systems are assumed to reflect the principles described in the primary mitigation section above. Review and update, if required.	
Structural failure	• Presence of corrosive substances. • Extreme wind loading.	• Collapse of flue stack and other tall structures.	• Human • Operational	• Safeguards embedded within the design (materials used and structural design), in response to the additional mitigation recommended in the HAZID study.	Yes. With implementation of embedded mitigation the risk of a major accident or disaster occurring is as low as reasonably possible.

13.8.3 **Table 13.5** demonstrates that with mitigation measures implemented all hazards are deemed to be minimised to a level of risk that it as low as reasonably possible.

13.8.4 In accordance with IEMA's definitions of a major accident and of a disaster, all residual effects are considered to be not significant.

13.9 Cumulative effects

13.9.1 In-combination effects may occur between hazards, the most relevant being the loss of critical infrastructure (telecoms) coinciding with a fire outbreak or major loss of containment of hazardous substances. This has the potential to delay emergency responders and therefore exacerbate the magnitude of impacts on human and environmental receptors through lengthened exposure to heat, flames or contaminants.

13.9.2 In line with the UK Government's guidance on telecoms resilience (Cabinet Office, 2013)[19], multiple layers of communication options will be in place that encompass a combination of technical and non-technical solutions, supported by a strategy for prioritising communication methods in the event of telecoms failure. Examples include trip alarms, pagers, radio, satellite, mobile and landline communications, all supported by emergency power generators. With these contingencies in place, a change in impact is not expected and is therefore assessed as not significant.

13.9.3 Other parts of the operational site have the potential to cause a cumulative effect, whereby a single incident at one part of the site coincides with an incident at the site of the Proposed Development, i.e. each incident would not amount to a major accident or disaster, but together constitute a much higher magnitude event.

13.9.4 Whilst the Proposed Development will be linked to the operation of the Site, the processes taking place at each are different and the potential for an unforeseen event in one process leading to an uncontrolled response in the other is very limited. This applies equally to the characteristics of the Proposed Development being very different to those of third party infrastructure on or adjacent to the site. As such, a cumulative effect is not expected to occur due to the extremely low probability of two independent events occurring at the same time. As part of the extension of the existing health and safety management system, a Simultaneous Operations (SIMOPS) risk assessment will be completed to ensure this type of cumulative effect will not occur. In addition to the above, there is potential for cumulative effects to occur should an event occur on the CO_2 pipeline that leads to the creation of a secondary event within the existing operational site. The risk of a such cumulative effects will be considered in an interface hazard study which will be undertaken during the Front End Engineering Design process, and once more certainty is available over the proposed pipeline route.

13.9.5 Whilst within the existing site and the area of the Proposed Development there is other infrastructure present, a cumulative effect is not expected to occur if there were an incident within the Site due to the extremely low probability of two independent

[19] https://assets.publishing.service.gov.uk/media/5a7c1f3040f0b61a825d6974/Emergency_Response_and_Recovery_5th_edition_October_2013.pdf

events occurring at the same time. Whilst the Proposed Development will be linked to the operation of the existing cement works, the processes taking place at each are different and the potential for an unforeseen event in one process leading to an uncontrolled response in the other is very limited.

13.9.6 For any external operations beyond the Site boundary, the relatively large distance from the potential source of a hazard with neighbouring operations is of a great enough distance that it is unlikely two events would interact and again there is an extremely low probability of two events occurring at the same time.

13.9.7 No change is expected due to inter-development and in-combination accidents and therefore, cumulative effects are assessed as not significant.

13.10 Assessment summary

13.10.1 This major accidents and disaster assessment has been informed by HAZID and HAZOP documents produced by the Applicant along with a review of national and regional risk registers.

13.10.2 The only hazard identified that may give rise to a major accident or disaster during the construction phase, is the risk of disturbing unidentified, unexploded ordinance. Therefore, an unexplored ordnance survey will be conducted, prior to the construction phase commencing.

13.10.3 The main sources of on-site risk relate to the potential for the following major accidents or disasters during operation of the Proposed Development:

- Loss of CO_2 containment due to equipment failure;
- Fire/explosion or environmental contamination due to equipment failure;
- Structural failure due to the use of corrosive process materials or due to extreme weather events; and
- Environmental contamination due to release of hazardous substances.

13.10.4 Existing health, safety and environmental management systems will be updated to include the Proposed Development. These management systems will outline the approach to safety and environmental management during operation and will include spill response and safe evacuation plans. Safety systems/process will also be installed prior to the Proposed Development being operational including emergency shutdown valves, gas detection and alarm systems, pipeline safety systems and pressure relief systems.

13.10.5 As concluded in **Table 13.5**; with the implementation of mitigation measures, all hazards are deemed to be minimised to a level of risk that is as low as reasonably possible and that the residual effects are considered to be not significant.

References

Cabinet Office (2013). *Emergency Response and Recovery*. Available at: https://assets.publishing.service.gov.uk/media/5a7c1f3040f0b61a825d6974/Emergency_Response_and_Recovery_5th_edition_October_2013.pdf

European Union (2012). *The Seveso III Directive (Directive 2012/18/EU)*. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32012L0018 (Accessed: December 2023)

HM Government (1974). *Health and Safety at Work etc. Act 1974*. Available at: https://www.legislation.gov.uk/ukpga/1974/37/contents (Accessed: November 2023)

HM Government (1992). *The Workplace (Health, Safety and Welfare) Regulations 1992*. Available at: https://www.legislation.gov.uk/uksi/1992/3004/contents/made (Accessed: November 2023)

HM Government (1996). *Pipelines Safety Regulations*. Available at: https://www.legislation.gov.uk/uksi/1996/825/contents/made

HM Government (1999). *The Management of Health and Safety at Work Regulations (1999)*. Available at: https://www.legislation.gov.uk/uksi/1999/3242/contents/made (Accessed: November 2023)

HM Government (2002). *The Dangerous Substances and Explosive Atmospheres Regulations 2002*. Available at: https://www.hse.gov.uk/fireandexplosion/dsear.htm

HM Government (2004). *Civil Contingencies Act*. Available at: https://www.legislation.gov.uk/ukpga/2004/36/contents

HM Government (2015). *The Construction (Design and Management) Regulations 2015*. Available at: https://www.hse.gov.uk/construction/cdm/2015/index.htm (Accessed: November 2023)

HM Government, (2015). *The Planning (Hazardous Substances) Regulations 2015*. Available at: https://www.legislation.gov.uk/uksi/2015/627/contents/made (Accessed: December 2023)

HM Government (2016). *Environmental Permitting Regulations*. Available at: https://www.legislation.gov.uk/uksi/2016/1154/contents/made

HM Government (2017). Town and Country Planning (Environmental Impact Assessment) Regulations 2017. Available at: https://www.legislation.gov.uk/uksi/2017/571 (Accessed: November 2023)

HM Government, (2020). *National Risk Register 2020 edition*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/952959/6.6920_CO_CCS_s_National_Risk_Register_2020_11-1-21-FINAL.pdf (Accessed: November 2023)

Institute of Environmental Management and Assessment (2020). *Major Accidents and Disasters in EIA: A Primer*. Available at: https://www.iema.net/resources/blog/2020/09/23/iema-major-accidents-and-disasters-in-eia-primer (Accessed: November 2023)

Wales Resilience Forum (2020). *The North Wales Community Risk Register*. Available at: https://www.gwynedd.llyw.cymru/en/Residents/Emergencies/Emergecy-documents/North-Wales-Community-Risk-Register.pdf (Accessed: December 2023)