Contents

Tables

19. Major Accidents and Disasters

19.1. Introduction

19.1.1. This chapter of the Environmental Statement (ES) presents a preliminary assessment of the potential impacts of Major Accidents and Disasters (MA&D) that have the potential to occur and the significant environmental effects of the Proposed Development with respect to during the construction, operation (including commissioning), and decommissioning phases. MA&Ds cover both impact on human health (both inside and outside the facility) as well as impact on environment. The assessment has been developed in accordance with best practice as laid out by the Institute of Environmental Management and Assessment (IEMA, 2020)

19.1.2. The objective of this assessment is identify appropriate precautions to prevent and mitigate potential MA&D events

19.2. Legislation, Planning Policy and Guidance

19.2.1. Legislation, planning policy, and guidance relating to Population and Human Health and pertinent to the Proposed Development are listed below:

Legislative Background

The EIA Directive (2014) and Infrastructure Planning (Environmental Impact Assessment) Regulations (2017)

19.2.2. The Infrastructure Planning (Environmental Impact Assessment) Regulations ('the EIA Regulations') (HM Government, 2017) implement the requirements of Directive 2014/52/EU (HM Government, 2014) of the European Parliament, and of the Council of 16 April 2014, amending Directive 2011/92/EU (HM Government, 2011) on the assessment of the effects of certain public and private projects on the environment ('EIA Directive'), which introduced the requirement for MA&D to be considered as part of the EIA process.

19.2.3. Regulation 5(4) of the EIA Regulations states that:

"The significant effects to be identified, described and assessed… include, where relevant, the expected significant effects arising from the

vulnerability of the proposed development to major accidents or disasters that are relevant to that development."

19.2.4. Schedule 4, paragraph 8 requires an Environmental Statement (ES) to provide:

"A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned."

19.2.5. An assessment of the risk of MA&D relevant to the Proposed Development is therefore required, together with the measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.

The Construction (Design and Management) (CDM) Regulations 2015

19.2.6. The Construction (Design and Management) (CDM) Regulations 2015 (HM Government, 2015a) ('the CDM Regulations') and accompanying guidance place particular duties on clients, designers and contractors, to ensure that health and safety is considered throughout the lifecycle of the project, from inception, design, construction, operation and into subsequent demolition and removal. Under the CDM Regulations, designers must avoid foreseeable risks, as far as reasonably practicable.

The Planning (Hazardous Substances) Regulations 2015 and The Control of Major Accident Hazards (COMAH) Regulations 2015

19.2.7. During its operation, depending on the volumes of hazardous materials stored on the Site, a Hazardous Substances Consent (HSC) may be necessary under the Planning (Hazardous Substances Regulations) 2015 (HM Government, 2015b) and the Proposed Development could be subject to the Control of Major Accident Hazards (COMAH) Regulations 2015 ('the COMAH Regulations') (HM Government, 2015c) which implement Directives 96/82/EC (EC, 1996) and 2003/105/EC (EC, 2003) on the control of major accident hazards involving dangerous substances.

19.2.8. The aim of the COMAH Regulations is the prevention of major accidents and limitation of their consequences for people and the environment. The competent authority for the purposes of the COMAH

Regulations in England is the Health and Safety Executive (HSE) and the Environment Agency (EA).

19.2.9. If the installation falls within the COMAH Regulations, as a Lower Tier establishment, the Applicant will be required to:

- take all measures necessary to prevent major accidents and limit their consequences for persons and the environment;
- prepare a Major Accident Prevention Policy (MAPP);
- implement a Safety Management System (SMS) that minimises the risk level to As Low as Reasonably Practicable (ALARP) for the establishment;
- prepare an on-site emergency plan; and
- notify any major accidents to the competent authority (HSE).

19.2.10. If the installation falls within the COMAH Regulations, as an Upper Tier establishment, the Applicant will be required to:

- take all measures necessary to prevent major accidents and limit their consequences for persons and the environment;
- prepare a Major Accident Prevention Policy (MAPP);
- implement a Safety Management System (SMS) that minimises the risk level to As Low as Reasonably Practicable (ALARP) for the establishment;
- prepare an on-site emergency plan;
- liaise with the local authority and emergency services to develop an off-site emergency plan and test it routinely;
- prepare, and update every five (5) years, a Safety Report, highlighting the Major Accident Hazards (MAH) for the site and demonstrate that ALARP (As Low as Reasonably Practicable) has been implemented with regards to preventative and mitigative measures; and
- notify any major accidents to the competent authority (HSE).

The Pipelines Safety Regulations (PSR) 1996

19.2.11. The primary legislation governing the safety of pipelines in the UK is the Pipelines Safety Regulations (PSR) 1996 (‘PSR 1996’) (HM Government, 1996a), as amended (SI 2023 No. 284) which encompasses control of aspects including integrity, safe design,

construction, installation, operation, maintenance, and decommissioning. The PSR considers emergency events and the need to ensure that procedures are in place to limit the risk of loss of containment. Specific reference is made to major accident hazards which, for the purposes of PSR, is defined as "death or serious injury involving a dangerous fluid". Additional duties are included in PSR for major accident hazard pipelines (MAHP) which transport products defined as dangerous fluids.

The Environmental Permitting Regulations (EPR) 2016

19.2.12. An Environmental Permit will be required for the operation of the Proposed Site in accordance with the Environmental Permitting Regulations (EPR) 2016 ('Environmental Permitting Regulations' (HM Government, 2016b). The Applicant will agree the permitting requirements with the Environment Agency (EA) and an Environmental Permit application will be made shortly after submission of the DCO Application.

The Health and Safety at Work Act 1974

19.2.13. The Health and Safety at Work Act (HSWA) (HM Government, 1974) provides a regulatory framework to ensure the provision of a safe working environment for those in the UK. It also includes provision for those visiting a worksite and those who may be affected offsite by workplace emergencies. It includes the requirement to undertake a risk assessment of occupational hazards and all reasonably foreseeable hazards that can affect operators, visitors, or members of the public, and apply the hierarchy of controls to mitigate identified risks such that the residual risks are reduced to As Low as Reasonably Practicable (the 'ALARP' principle) for the Proposed Development during the whole lifecycle of the proposed development (i.e. design, construction, commissioning, operation, decommissioning and disposal).

19.2.14. Many associated regulations have been made under the HSWA including, but not limited to, the following which have relevance to the control of MA&D of the Proposed Development:

- The Workplace (Health, Safety and Welfare) Regulations 1992 (HM Government, 1992);
- The Gas Safety (Management) Regulations (SI 1996 No. 551) (HM Government,1996b) amended in 2023 as The Gas Safety (Management) (Amendment) Regulations 2023 (HM Government,

2023a) and The Gas Safety (Management) (Amendment) (No. 2) Regulations 2023 (HM Government, 2023b);
- The Management of Health and Safety at Work Regulations (SI 1999 No. 3242) (HM Government, 1999);
- The Control of Substances Hazardous to Health Regulations (SI 2002 No. 2677) (HM Government, 2002a); and
- The Dangerous Substances and Explosive Atmospheres Regulations (SI 2002 No. 2776) (HM Government, 2002b).

19.2.15. The Proposed Development will be subject to the HSWA and associated regulations, including those listed above. These regulations will be referenced where appropriate throughout the assessment, however, this assessment does not seek to duplicate the assessment of matters covered by these regulatory regimes. Instead, it assumes that they are embedded in the design and operation of the Proposed Development and are effective in their intent to reduce residual risks to ALARP.

Other Relevant Legislation

19.2.16. The legislative basis for issues which may influence the control of, or responsibility for, MA&D, in the UK, includes, but is not limited to, the following regulations. This legislation is referenced where appropriate in the course of this assessment, but, as stated above, this assessment does not substitute for the appropriate assessment of matters required by these regulations:

- The Pipe-Lines Act (SI 1962 No. 58) (Regnal. 10_and_11_Eliz_2_) (HM Government, 1962);
- Occupier's Liability Act (SI 1984 No. 3) (HM Government, 1984);
- Civil Contingencies Act (SI 2004 No. 36) (HM Government, 2004);
- The Supply of Machinery (Safety) Regulations (SI 2008 No. 1597) (HM Government, 2008a);
- The Provision and Use of Work Equipment Regulations (SI 1998 No. 2306) (HM Government, 1998b);
- The Regulatory Reform (Fire Safety) Order (HM Government, 2005) (Ref 19-24);
- The Building Regulations 2010 (HM Government, 2010);
- Classification, Labelling and Packaging (CLP) Regulations (SI 2015 No. 21) (HM Government, 2015d), which have been retained in law with modifications as the 'Retained CLP Regulation (EU) No.

1272/2008 as amended for Great Britain' due to the UK exit from the EU (HM Government, 2008b);

- The Lifting Operations and Lifting Equipment Regulations 1998 (SI 1998/2307) (HM Government, 1998);
- The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations (SI 2016 No. 1107) (HM Government, 2016a); and
- The Pressure Equipment (Safety) Regulations (SI 2016 No. 1105) (HM Government, 2016c).

Planning Policy Context

National Planning Policy

19.2.17. The National Policy Statements (NPS) for energy infrastructure set out the Government's policy for the delivery of major energy infrastructure (Department of Energy Security and Net Zero (DESNZ), 2023a).

19.2.18. On 24 April 2025, DESNZ published a consultation on revisions to the NPS. This consultation on the material amendments concluded on 29 May 2025, and draft revisions have since been published (DESNZ, 2023a). The outcomes from the consultation have not resulted in any material changes to the conclusions of this chapter.

Overarching Policy Statement for Energy (EN-1) (2023)

19.2.19. Section 4.13.1 of EN-1 (DESNZ, 2023a) states that the Health and Safety Executive (HSE) is responsible for enforcing health and safety legislation, some of which is relevant to the construction, operation and decommissioning of energy infrastructure.

19.2.20. Section 4.13.3 of EN-1 (DESNZ, 2023a) states that some energy infrastructure will be subject to the COMAH Regulations. These Regulations aim to prevent major accidents involving dangerous substances and limit the consequences to people and the environment of any that do occur. COMAH regulations apply throughout the life cycle of the facility, i.e. from the design and build stage through to

decommissioning. They are enforced by the Competent Authority comprising the HSE and the EA acting jointly in England.

19.2.21. Section 4.14.1 of EN-1 (DESNZ, 2023a) states that all establishments wishing to hold stocks of certain hazardous substances above a threshold need a Hazardous Substances Consent (HSC).

19.2.22. Section 4.14.2 of EN-1 (DESNZ, 2023a) states that the Hazardous Substances Authority (HSA) has responsibility for deciding whether the risk of storing hazardous substances is tolerable for the community. The HSA will usually be the local planning authority (LPA).

19.2.23. Section 4.14.5 of EN-1 (DESNZ, 2023a) states that applicants must consult the HSA and HSE at pre-application stage for such consents, if the project is likely to need a Hazardous Substances Consent.

19.2.24. Section 4.16.2 of EN-1 (DESNZ, 2023a) states that DESNZ works closely with UK Government security agencies including the National Protective Security Authority (NPSA) and the National Cyber Security Centre (NCSC) to provide advice to the most critical infrastructure assets on terrorism and other national security threats, as well as on risk mitigation.

The National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2023)

19.2.25. The NPS for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (DESNZ, 2023b) references Major Accidents in section 2.6: Control of Major Accident Hazards, which refers back to section 4.13 of EN-1 with respect to the COMAH Regulations (HM Government, 2015c). In section 2.21: Natural Gas and Oil Pipelines, which states that the HSE enforces the Pipeline Safety Regulations (PSR) (HM Government, 1996a) which are the principal legislation governing the safety of pipelines and require that pipelines are designed, constructed and operated so that the risks are As Low as Reasonably Practicable (ALARP).

The National Policy Statement for Electricity Networks Infrastructure (EN-5) (2023)

19.2.26. The NPS for Electricity Networks Infrastructure (EN-5) (DESNZ, 2023c) makes no reference to MA&D assessment.

The National Planning Policy Framework (2024)

19.2.27. The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities & Local Government (MHCLG), 2024) refers to hazards in the context of planning decision making in paragraphs 46 and 102(a) as follows:

- "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."
- "Planning policies and decisions should promote public safety and take into account wider security and defence requirements by … anticipating and addressing possible malicious threats and other hazards (whether natural or man-made), 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. …"

The Planning Practice Guidance for Hazardous Substances (2019)

19.2.28. The Planning Practice Guidance (PPG) for Hazardous Substances (DLUHC, 2019) explains land use planning controls relating to the storage of hazardous substances in England and how to handle development proposals around hazardous establishments. This includes guidance on:

- Hazardous Substances Consent (HSC);
- dealing with hazardous substances in plan-making; and
- handling development proposals around hazardous installations.

Local Development Plan Policy

19.2.29. North Lincolnshire Council (NLC) is preparing a new Local Plan to 2043. Once formally adopted, it will replace the current North

Lincolnshire Local Plan, the Core Strategy and the Housing and Employment Land Allocations Development Plan Documents.

19.2.30. In May 2025 NLC carried out an initial engagement and call for sites consultation and published an addendum document at the same time. The document identifies climate change and greenhouse gas reduction as one of the main issues for the new Local Plan. It also recognises that transitioning to low-carbon and renewable energy sources will not only decrease emissions but also enhance fuel security and stimulate economic growth. The consultation concluded in July 2025.

19.2.31. The North Lincolnshire Local Plan (September 2007) policy DS10 - New Hazardous Installations and Pipelines (NLC, 2007) is relevant to the MA&D assessment in that it notes that:

- *"Planning permission for developments which involves the storage of materials or the carrying out of processes that are toxic, highly reactive, explosive or highly flammable will only be granted if the applicant can demonstrate that the proposal will impose no significant development restrictions upon surrounding land users; will not put at risk surrounding residential properties; or prove a risk to other premises in the locality where significant numbers of people regularly congregate".*

Other Guidance

19.2.32. The Institute of Environmental Management and Assessment (IEMA, September 2020) has developed a guidance document 'Major Accidents and Disasters in EIA: A Primer' (IEMA, 2020) to increase awareness of major accidents and disasters within EIA and its application. The guidance outlines an assessment methodology based on known current practice within the UK to date, and key terminology that can be used in MA&D assessments. This guidance, in particular the assessment methodology and terminology, has been considered within this assessment.

19.2.33. There is also a considerable amount of information and guidance available to developers on the identification and control of major hazards associated with the design and operation of gas fired power stations, the storage and use of chemicals, and Major Accident Hazard Pipelines (MAHP) conveying high pressure gases. Comparable facilities have been in operation for many years and employ

conventional, established technology to produce electrical power from the combustion of natural gas. The HSE has published a number of applicable guidance notes on their website relating to these assets, including:

- Emergency planning for major accidents: Control of Major Accident Hazards Regulations 2015 (COMAH), (HSG 191 (HSE, 2015); and
- Further guidance on emergency plans for major accident hazard pipelines (HSE, 1996a).

19.2.34. As a regulator, the HSE uses the principles of 'As Low as Reasonably Practicable' ('ALARP') in risk management. In a practical sense, ALARP involves 'weighing a risk against the trouble, time and money needed to control it' noting that 'ALARP describes the level to which we expect to see risks controlled' (IEMA, 2020). For the purposes of this assessment, ALARP has been used.

19.2.35. Guidance for power stations operating on Hydrogen and Hydrogen transmission pipelines specifically is currently an area of development in the UK. Where there is no specific guidance available, best practices as informed by technology providers, industry bodies (e.g. IGEM) and HSE advice shall be followed.

19.2.36. Other guidance that is of relevance to the assessment of MA&D includes:

- Advice on working with public bodies in the infrastructure planning process, Annex G: The Health and Safety Executive (HSE, 2024);
- Reducing Risks, Protecting People: HSE's decision making process, (HSE, 2001);
- Major Hazard Regulatory Model: Safety Management in Major Hazard Sectors (HSE) (HSE, n.d.);
- Chemicals and Downstream Oil Industries Forum Guidelines, Environmental Risk Tolerability for COMAH Establishments (CDOIF, 2017);
- Guidelines for Environmental Risk Assessment and Management (Defra, 2011);
- BS ISO 31000:2018 Risk Management - Guidelines (BSI, 2018);
- Chapter 4 of the Cabinet Office's Emergency Preparedness guidance on part 1 of the Civil Contingencies Act 2004 (hereafter

referred to as the 'CCA risk assessment framework') (Cabinet Office, 2012); and

- Department for the Environment, Guidance on the Interpretation of Major Accidents to the Environment (MATTE for the purposes of COMAH Regulations, 2023) (Department for the Environment, Transport and Regions, 1999).

19.2.37. Additionally, the following guidance has been considered in the identification of potential major accidents and disasters:

- The National Risk Register (HM Government, 2025a); and
- Early Warning, Early Action (The International Federation of Red Cross & Red Crescent Societies, 2022).

19.3. Assessment Methodology and Significance Criteria

Definitions

19.3.1. The document, "MA&D in EIA: An IEMA Primer" (IEMA, 2020), defines major accidents and disasters as follows:

*"*A major accident is an event (for instance, train derailment or major road traffic incident) that threatens immediate or delayed serious effects to human health, welfare and/or the environment and requires the use of resources beyond those of the client or its appointed representatives (e.g., contractors) to manage."

"A disaster is a man-made/external hazard (such as an act of terrorism) or a natural hazard (such as an earthquake) with the potential to cause an event or situation, which meets the definition of a major accident above.*"*

19.3.2. Events that have the potential to cause a Major Accident / Disaster are termed risk events, which are also defined in the IEMA guidance as follows:

"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."

19.3.3. The criteria included in this assessment, to define an accident or disaster as major, aligns with the criteria for an incident which would be notifiable to the European Commission as listed within Schedule 5 of

the COMAH Regulations (HM Government, 2015c). This notification to the European Union (EU) is no longer required following the UK's exit from the EU, however the criteria are still considered relevant to the identification of MA&D, as an accident or disaster that causes:

- any fire or explosion or accidental discharge of a dangerous substance involving a quantity of at least 5% of the quantity in Column 3 of Part 1 or in Column 3 of Part 2 of Schedule 1;
- an injury to a person which is fatal;
- up to six (6) persons injured within the establishment and hospitalised for at least twenty-four (24) hours (hrs);
- one person outside the establishment is hospitalised for at least twenty-four hrs;
- a dwelling outside the establishment is damaged and is unusable as a result of the accident;
- the evacuation or confinement of persons for more than two (2) hrs, where the value (persons × hrs) is at least five hundred (500);
- the interruption of drinking water, electricity, gas or telephone services for more than two hrs, where the value (persons × hrs) is at least one thousand (1,000);
- damage to property in the establishment, to the value of at least two million Euro;
- damage to property outside the establishment, to the value of at least five hundred thousand Euro;
- permanent or long-term damage to terrestrial habitats involving:
  - 0.5 hectares (ha) or more of a habitat of environmental or conservation importance protected by legislation; or
  - 10 ha or more of more widespread habitat, including agricultural land.
- significant or long-term damage to freshwater and marine habitats involving:
  - 10 km or more of river or canal; or
  - 1 ha or more of a lake or pond; or
  - 2 ha or more of delta; or
  - 2 ha or more of a coastline or open sea.
- significant damage to an aquifer or underground water of 1 ha or more.

19.3.4. A credible scenario as defined by CDOIF (CDOIF, 2017) is:

"*the scenarios under which a source could credibly pollute a receptor (for example spills, fire, explosion*)."

Overview

19.3.5. The Proposed Development will be located within land at and in the vicinity of the boundary of the existing Keadby Power Station site near Scunthorpe, Lincolnshire. The Main Site, together with the on-site connection corridor for the electrical grid connection, in addition to hydrogen and natural gas above ground installations (AGIs), water abstraction and effluent discharge, will be located within the administrative boundary of North Lincolnshire Council (NLC).

Study Area

19.3.6. The study area for assessment of MA&D is not defined within regulatory guidance or a standardised methodology but is shown in **ES Volume III Figure 19.1:** Listed COMAH Sites within 5km of the Main Site (**Application Document Ref. 6.4**).

19.3.7. The study area used in this assessment was defined with reference to the likely "Zone of Influence" (ZoI) over which the Proposed Development may have potential to result in significant MA&D effects on relevant receptors.

19.3.8. The ZoI is event specific and accounts for the principle of the Rochdale Envelope in relation to worst-case needs for assessment purposes.

19.3.9. The Proposed Development could be subject to the COMAH Regulations (pending confirmation of COMAH applicable hazardous substances inventories and definition of COMAH establishment boundaries) and professional judgement has been applied in defining the ZoI, recognising the current design stage of the plant and equipment and consideration of potential Major Accident Hazards (MAH). As the detailed design of the Proposed Development progresses safety information will be prepared for submission to the Health and Safety Executive (HSE), if required by COMAH, specifying the Major Accident Hazards (MAH) and the residual impacts and

demonstrating the application of ALARP (As Low As Reasonably Practicable) techniques.

19.3.10. A 5 km study area around the Site Boundary (the 'study area') has been considered, as shown on **ES Volume III Figure 19.1:** Listed COMAH sites within 5km of the Main Site (**Application Document Ref. 6.4**). recognising that this area includes several installations regulated by the COMAH Regulations and MAH pipelines regulated by the PSR (HM Government, 1996a), and that COMAH requires the consideration of "domino" effects with neighbouring assets. The 5 km has been selected on the basis that MAH sites greater than 5 km from the Site are unlikely to be directly affected, unless there is a Domino linkage with another site within the study area, and this would be dealt with through the COMAH Regulations (HM Government, 2015c).

Impact Assessment Methodology

19.3.11. MA&D scenarios have been considered for each phase of the Proposed Development, namely construction, commissioning, operation (including commissioning) and decommissioning.

19.3.12. In accordance with the principles of the IEMA guidance "Major Accidents and Disasters: An IEMA Primer" (IEMA, 2020), the MA&D assessment criteria is based upon a risk assessment process, which considers the consequences and likelihood of a risk event occurring. In terms of consequence (severity and duration), the primary criteria has been considered together with the guidance provided as part of the Civil Contingencies Act (HM Government, 2004), as well as guidance on environmental risk tolerability from the Chemicals and Downstream Oils Industry Forum (HM Government, 2017), to develop project-specific assessment criteria. This has been revised from the Scoping Stage as the CDOIF guidance requires design information not currently available at the current stage of design (i.e. Quantitative Risk Assessment (QRA), preliminary Consequence Modelling and Hazard Identification (HAZID) studies) to determine levels of consequence for a risk event. The CDOIF guidance has still been considered to further subdivide and provide more details regarding categories of receptors.

19.3.13. The following steps have been followed to identify credible MA&D scenarios for detailed assessment:

- baseline information relevant to MA&D has been collated, including the potential for natural disasters (e.g., as a result of seismic activity or climate change), and the presence of neighbouring industrial

facilities, for example, any sites regulated by the COMAH Regulations (HM Government, 2015c);

- an assessment of the substances which will be present within the Site has been carried out to identify those classified as hazardous, in accordance with the CLP Regulations (HM Government, 2015d). The storage requirements and process uses of hazardous substances has been identified to determine the potential for Risk Events, which could constitute a MA&D related to these substances. Substances, which are not classified as hazardous, or are present in relatively minor quantities, have been discounted at this stage;
- a review of the operations and activities carried out throughout the lifecycle of the Proposed Development has been undertaken to determine the potential for Risk Events which could constitute a MA&D related to these activities;
- a long list of unscreened Risk Events for MA&D has been collated, considering the substances, the activities and the baseline conditions that have been identified;
- the resulting long list has been subject to a screening assessment, utilising the consequence criteria and potential likelihood as coarse filters. Those MA&D Risk Events which are considered very unlikely to occur (for example, due to the location of the Proposed Development) or for which there is no credible source-pathway-receptor linkage, have not been taken forward for further assessment. This is found in **ES Volume II Appendix 19A:** Long List of MA&D Risk Events (**Application Document Ref. 6.3)**; and
- all remaining MA&D Risk Events have been shortlisted for further assessment.

19.3.14. For those MA&D Risk Events which have been scoped in for detailed assessment, the following assessment process has been followed:

- Credible Scenarios related to the Risk Event have been identified – these constitute a reasonably foreseeable worst-case incident of the identified Risk Event;
- the potential impact of Credible Scenarios on environmental resources / receptors has been estimated using the source – pathway – receptor linkage model;

- the magnitude of potential impacts of Credible Scenarios has been assessed, considering the severity of harm, its duration, and its consequences, as well as its probability of occurrence;
- mitigation measures to eliminate the risk have been identified where possible; and if not possible, to reduce the risk to a level demonstrated to be ALARP (As Low as Reasonably Practicable); and
- the tolerability of any residual risk has been qualitatively considered.

19.3.15. The tolerability of the risk of a MA&D Credible Scenario is categorised via the application of professional judgement on the reasonably foreseeable worst-case consequence and the likelihood of occurrence. Risks are categorised as:

- **Tolerable.** The levels of risk are generally regarded as adequately controlled and comparable to those that people regard as trivial in their daily lives. Further action to reduce risks is not normally required, as such they are generally considered to be broadly acceptable;
- **Tolerable (if ALARP)**. People are prepared to tolerate this level of risk in order to secure benefits, such as employment or infrastructure. The expectation is that risks are properly assessed and kept as low as reasonably practicable (ALARP) through the application of appropriate mitigation, and risks are kept under review; and
- **Intolerable**. A risk falling into this region is regarded as unacceptable, whatever the level of benefits associated with the activity.

19.3.16. The definitions of the above terms are contained in the document, "Reducing Risks, Protecting People" (HSE, 2001).

19.3.17. As a general rule, **Tolerable** and **Tolerable (if ALARP)** risks are considered as being **Not Significant** and **Broadly Acceptable** in the context of MA&D. **Intolerable** risks are considered to be **Significant** and **Unacceptable**.

19.3.18. Risks categorised as Tolerable (if ALARP) generally require further assessment, typically carried out as part of the detailed design process

and the development of a COMAH Safety Report (if required should the establishment be Upper Tier) to the Health and Safety Executive (HSE), to allow operation. Detailed supporting studies as part of the COMAH Regime (both Lower and Upper Tier) could include Site Quantitative Risk Assessment (QRA), preliminary Consequence Modelling, Hazard Identification (HAZID) studies, Hazard and Operability (HAZOP) studies, Fire and Explosion Risk Assessment (FERA).

19.3.19. The scope of the future studies will be in accordance with good engineering design practice and the HSE requirements to demonstrate ALARP has been applied to mitigate risks to an acceptable level without significant impacts. Where appropriate, the HSE will be consulted on the content of the COMAH submission (if required) and supporting studies as they develop.

19.4. Use of the Rochdale Envelope

19.4.1. In order to ensure a robust assessment of the likely significance of the environmental effects of the Proposed Development, the ES is being undertaken adopting the principles of the 'Rochdale Envelope' approach in line with The Planning Inspectorate's Advice Note 9 (HM Government, 2025). This involves assessing the worst-case parameters for the elements where flexibility needs to be retained. These parameters have been used to inform the representative worst-case scenario that has been assessed in this chapter, in order to provide a robust assessment of the impacts and likely significance of environmental effects of the Proposed Development at its current stage of design.

19.4.2. At this stage in the project, safety and control systems have not yet been designed for the Proposed Development, however, standard industry approaches to managing risk will be used. In addition, equipment such as process monitoring and safeguarding systems, and embedded mitigation such as fire, flammable gas, toxic gas and leak detection, fire protection systems and emergency shutdown systems

will be installed as required by industry standard practice and design codes.

19.5. Baseline Conditions

Sources of Information / Data

19.5.1. The following data sources have been utilised to inform the scoping baseline:

- National Risk Register 2025 (Cabinet Office, 2025);
- Overview of Natural and Man-made Disaster Risks the European Union may face (EC, 2021);
- British Geological Survey (BGS) GeoIndex Onshore (BGS, 2024);
- COMAH 2015 Public Information Search (HSE, 2015); and
- Google aerial and street view maps covering the study area (Google, 2024).

19.5.2. As the Proposed Development's design progresses, additional datasets may be included where relevant to assist the assessment of MA&D.

Infrastructure and Industrial Sites Receptors

Existing Baseline

19.5.3. The Site is adjacent to the Keadby 1 and Keadby 2 Power Stations (see **ES Volume I Chapter 3:** Site and Surrounding Area (**Application Document Ref. 6.2**) and falls within the administrative area of North Lincolnshire Council (NLC).

19.5.4. The nearest COMAH sites are:

- Flixborough Industrial Estate (Upper Tier COMAH site) operated by Jotun Paints Ltd located 4.5km north-east of the centre of the Proposed Main Site; and
- Grove Wharf, Gunness, (Lower Tier COMAH site) operated by Brenntag UK Limited located 2.6km north-east of the centre of the Proposed Main Site.

19.5.5. The COMAH sites are listed in **Table 19.1**.

Table 19.1: List of COMAH sites within 5km of the Proposed Development

Site name	Operator	Approximate Distance from Site	Direction
Flixborough Industrial Estate	Jotun Paints Ltd	4.5km	NE
Grove Wharf, Gunness	Brenntag UK Ltd	2.6km	NE

Table 19.2: List of non-COMAH industrial sites within 5km of the Proposed Development

Site name	Operator	Approximate Distance from Main Site	Direction	Environmental Permit	HSC
Northmoor Farm	Rockscape Energy Ltd	1.1km	SW	Y	
PD Port Services	PD Ports	1.2km	E	N	Y
2 Sisters Food Group Ltd	2 Sisters Food Group Ltd	2.2km	NW	Y	
Ealand Farm	P.D.Hook (Breeders) Ltd	2.3km	NW	Y	
Flixborough Mill	AB Agri Ltd	3.5km	NE	Y	

Site name	Operator	Approximate Distance from Main Site	Direction	Environmental Permit	HSC
Glanford Power Station	EPR Glanford Limited	3.6km	NE	Y	
Mason Farm Poultry Unit	P.D.Hook (Rearing) Ltd	4.0km	NW	Y	
Scunthorpe Meat Processing Facility	OSI Food Solutions UK Ltd	4.3km	NE	Y	
Park Farm	Hook 2 Sisters Ltd	4.4km	NE	Y	
Land off Stather Road	ARL 018 Ltd	4.6km	NE	Y	

19.5.6. The nearest non-COMAH industrial sites within 5km of the Main Site are listed in **Table 19.2**. This includes one site with HSC within 5km of the site, located approximately 1.2km from the Proposed Main Site. This consent (PA/2014/0176) is registered to PD Port Services for ammonium nitrate-based fertilisers, which conforms to the Fertilisers Regulations 1991(a) (HM Government,1991) and composite fertilisers containing phosphate and/or potash. However, according to the

Landmark EnviroCheck Report (2020) (Ref 19-56) the status of this consent appears to have been withdrawn.

19.5.7. There are a number of MAH pipelines within 5km of the site and are listed in **Table 19.3**.

Table 19.3: List of MAH pipelines within 5km of the Proposed Development

Site name	Operator	Approximate Distance from Main Site	Direction
Eastoff to Keadby	National Gas	0km	-
Cawood to Suswood Trent West	National Gas	232m	SW
New proposed pipeline to supply site (part of development)	Tbc (may be SSE Thermal)	Not known at this time	Expected from West

19.5.8. The existing Keadby 1 Power Station and Keady 2 Power Station could present a risk of a MA&D that requires consideration, particularly given their close proximity to the Proposed Site. It is noted that the Applicant operates an Environmental Management System (EMS) which is integrated within a Safety, Health and Environmental (SHE) Management System, accredited to BS EN ISO 14001:2015+A1:2024 - TC (BSI, 2024) and BS EN ISO 45001:2003+A1:2024 standards (BSI, 2024). The SHE Management System is underpinned by a Safety and Health Policy which includes a Major Accident Prevention Policy and Environment and Climate Change Policy and broadly covers:

- systematic identification of hazards and risk assessment;
- plant integrity and maintenance;
- safe systems of work;
- controls for the safe operation of processes; and
- emergency planning, including preparedness and response.

19.5.9. Transport infrastructure within the study area includes ports, roads and railways. The nearest airfield is the privately owned Sandtoft Airfield located approximately 4.6km south-west of the closest part of the Site (A18 junction improvement). Although the airfield has not published details of any relevant aerodrome safeguarding or obstacle limitation surface (OLS) distances, it is considered that the Site would be highly unlikely to interfere with any such zones, if they exist, given the intervening distance. Additionally, other transport infrastructure nearby to the Site include, the North Moor Aero Club and Humberside Airport. The North Moor Aero Club is located approximately 8km south-west of the closest part of the Site, and Humberside Airport is located approximately 26.4km east of the closest part of the Site. Both of the sites are greater than 5km from the Site and therefore is it considered the Site is also highly unlikely to interfere with zones associated with air transport infrastructure.

19.5.10. The South Humberside Main Line passenger rail line interacts with the Site within the Scunthorpe to Doncaster section where it runs beneath the privately owned and purpose built North Pilfrey Bridge. North Pilfrey Bridge also spans the Stainforth and Keadby Canal used by pleasure craft and anglers. The bridge was designed to ensure that the minimum headroom clearance (approx. 5.2m above track level) specified by Network Rail was adhered to and was constructed in 2012. As the bridge has been operating for its intended purposes since this time and the proposed use of the bridge by the Proposed Development for construction and operational traffic is consistent with its existing use, the only relevant MA&D consideration relates to compliance with any weight restrictions for North Pilfrey Bridge during transport of Abnormal Indivisible Loads (AIL) during construction, to avoid a potential MA&D risk to this asset. Further information on the proposed AIL route is included in **ES Volume I Chapter 4:** The Proposed Development (**Application Document Ref. 6.2**) and **ES Volume I Chapter 5**: Construction Programme and Management (**Application Document Ref. 6.2**).

19.5.11. Keadby Wind Farm is located North of the Site and owned and operated by SSE Renewables Ltd. The design of the Proposed Development has carefully considered the location of existing turbines and design mitigation including exclusion zones.

19.5.12. The Site contains a number of utilities including high voltage overhead lines and equipment, an existing 400kV and 132kV electrical substation and high pressure gas infrastructure which may pose a risk to the Site.

Risks associated with the on-Site facilities have been implicitly considered in the design of the Proposed Development.

Sensitive Resources and Receptors

Existing Baseline

19.5.13. The MA&D assessment will account for the sensitive resources and receptors within the MA&D study area, summarised in Table 19.4**,** as well as the interactions between them.

Future Baseline

19.5.14. The future baseline scenarios are set out in **ES Volume I Chapter 4** (**Application Document Ref. 6.2**).

19.5.15. **ES Volume I Chapter 21:** Cumulative and Combined Effects (**Application Document Ref. 6.2**) identifies developments that either have consent (and so may be constructed and/ or commence operating) or are in the consenting process. The initial long-list was screened through consultation with the local planning authorities to identify developments to be taken forward (shortlisted) into the cumulative assessment.

19.5.16. For the purposes of this Chapter, the shortlisted developments, detailed in **ES Volume I Chapter 21:** Cumulative and Combined Effects (**Application Document Ref. 6.2**) will be considered as part of the future baseline, as they will be assumed to have been constructed before or during the construction of the Proposed Development.

19.5.17. To provide a conservative assessment, the identified shortlist of schemes presented in Section 19.7 will be considered as potential receptors to MA&D risks during construction and operation of the Proposed Development within the assessment presented in the ES.

19.5.18. The list of developments has also been reviewed in order to determine whether they are likely to give rise to new off-site hazards that could impact the Proposed Development.

19.5.19. The potential for climate change to impact upon the frequency and severity of meteorological hazards in future years is inherent within the assessment and discussed in **ES Volume I Chapter 18:** Climate Change and Sustainability (**Application Document Ref. 6.2**).

Table 19.4: Potential Receptors within the Zone of Interest (ZoI) and Distance from the Main Site

Receptor Type	Sensitive Receptor	Location
Human Health	Village of Keadby	Adjacent to the Water Discharge Corridor and approximately 1km east from the Proposed Main Site at its closest point
Human Health	Properties along Trent Road including Blacksmiths Cottage (former Trentvale Preparatory School), No. 7 and 8 Mariners Arms Flats and No. 19 Trent Side	The closest of this group of properties is located immediately adjacent to (within 5m of) the Water Connection Corridor (River Water Abstraction Option)
Human Health	A pair of semi-detached residential properties 'Holly House' and 'Hawthorn House'	Located 0m (Hawthorn House) and 35m (Holly House) west of the Water Discharge Corridor on Chapel Lane
Human Health	Properties along Chapel Lane	Located 50m east of the Water Discharge Corridor
Human Health	A single residential property (No. 5 Trent Side),	Approximately 35m east of the Construction Access Haul Route and approximately 20m west of the Waterborne Transport Offloading Area
Human Health	An individual property at Vazon Bridge,	Approximately 50m south of the Site boundary, adjacent to the Stainforth and Keadby Canal;
Human Health	Scunthorpe Sea Cadets – Boat Station	Located approximately 55m south of the Site boundary, adjacent to the Stainforth and Keadby Canal

Receptor Type	Sensitive Receptor	Location
Human Health	Pilfrey Farm	Immediately to the north of the Gatehouse Utility Connection Works and approximately 250m east of the skew construction access road from the A18
Human Health	Farms along Bonnyhale Road including Ealand Warpings	Approximately 190m north-west of the construction and operational Access Route and North Pilfrey Farm, located 225m west of North Pilfrey Bridge
Human Health	North Moor Farm	Located Approximately 500m north of the Emergency Access Route between the Main Site and Chapel Lane
Human Health	Keadby Grange	Approximately 510m east of the Construction Laydown areas, within the agricultural fields north of the A18
Human Health	Boskeydyke Farm	Located approximately 1.1km north of the Water Discharge Corridor
Human Health	Ealand Poultry Farm, located on Bonnyhale Moor Road	Approximately 1.6km west of the Proposed Site

Receptor Type	Sensitive Receptor	Location
Historical / Cultural - non-designated sites	Multiple sites: Scheduled monument (also a grade II listed building) at Keadby Lock on the Stainforth and Keadby Canal [NHLE 1005204]	Located adjacent to the Waterborne Transport Offloading Area. One further scheduled monument lies approximately 4.4km north-east of the Site at Flixborough Saxon Nunnery and Site of All Saints Medieval Church and Burial Ground [NHLE 1009382].
	Other listed buildings in the study area are concentrated in its settlements at Keadby, Althorpe, Gunness, Ealand and Crowle, as well as features associated with land improvement such as late-18th to early-19th century drainage syphons and sluices [1346690, 1084319 and 1076974.	Keadby, Althorpe, Gunness, Ealand and Crowle
	Church of St Oswald, (grade I listed building)	Althorpe
	Church of St Oswald, (grade I listed building)	Crowle
	A number of non-designated standing buildings in North Lincolnshire HER (Historic Environment Record)	In North Lincolnshire HER (Historic Environment Record), within 1km of Site
Landscape/Visual	Keadby Wind Farm	0.6km southwest of Site
Landscape/Visual	Overhead electricity pylons and transmission lines converging near the existing Keadby 1 and Keadby 2 Power Stations	Electricity pylons are 0km from the Site and are located north, south, east and west of the Main Site. Transmission lines are located 6.5km east of the Site

Receptor Type	Sensitive Receptor	Location
Environmental – Designated Ecological Site	Humber Estuary - Ramsar Humber Estuary - SSSI (Site of Specific Scientific Interest) Humber Estuary - SAC (Special Area of Conservation)	0km from Site Within the land required by the Proposed Development, the River Trent has been identified as a potential water abstraction location and discharge, and during construction the existing infrastructure associated with the Waterborne Transport Offloading Area adjacent to the River Trent is proposed to be used to facilitate offloading of AIL, as has been undertaken for Keadby 2 Power Station construction
Environmental – Designated Ecological Site	Crowle Borrow Pits - SSSI	1.2km from Site
Environmental – Designated Ecological Site	Hatfield Chase Ditches - SSSI	1.4km from Site
Environmental – Designated Ecological Site	Eastoft Meadow - SSSI	3.7km from Site
Environmental – non-designated sites	Hatfield Waste Drain - LWS (Local Wildlife Site)	0km from Site - crossed by the existing Mabey Bridge to be replaced
Environmental – non-designated sites	Keadby Boundary Drain - LWS	0km from Site - adjacent, to the west of Keadby Common (the Main Site)
Environmental – non-designated sites	Keadby Warping Drain - LWS	300m from Site - crossed by the buried pipeline for the existing line of discharge from Keadby 1 Power Station
Environmental – non-designated sites	North Engine Drain, Belton - LWS	0km from Site - south of the Mabey Bridge replacement works at the entrance off the A18

Receptor Type	Sensitive Receptor	Location
Environmental – non-designated sites	South North Engine Drain, Belton LWS	0km from Site - south of the Mabey Bridge replacement works at the entrance off the A18
Environmental – non-designated sites	River Torne LWS	45m south of the Mabey Bridge replacement works at the entrance off the A18
Environmental – non-designated sites	South Soak Drain, Keadby LWS	25m south-east of the Water Abstraction Corridor
Environmental – non-designated sites	Keadby Wetland LWS	25m south of the Water Abstraction Corridor
Environmental – non-designated sites	Keadby Wet Grassland LWS	25m south-east of the Potential Canal Water Abstraction Option on the Stainforth and Keadby Canal
Environmental – non-designated sites	Keadby Wet Grassland LWS	50m south of the canal water abstraction
Environmental – non-designated sites	Three Rivers LWS	90m south of the Waterborne Transport Offloading Area
Hydrological	Floodplain of the tidal River Trent	1.3km east of Site
Hydrological	Isle of Axholme and North Nottinghamshire Water Level Management Board area	Isle of Axholme and North Nottinghamshire Water Level Management Board – covers the area from Ousefleet to Scaftworth
Hydrological	Warping Drain (also known as Eastoft Moor Drain)- Ordinary Watercourse	Flows east and into the tidal River Trent via sluice gates. Overlaps slightly onto the north-eastern spur of the Site; west-east direction.

Receptor Type	Sensitive Receptor	Location
Hydrological	Keadby Boundary Drain, an Ordinary Watercourse	Approximately 160m west of the Site
Hydrological	North Nottinghamshire Water Level Management Board (NNWLMB) maintained Glew Drain	0km from Site, within Site boundary on the Northern edge of the Site boundary
Hydrological	North Soak Drain and South Soak Drain	Lies generally to the south of the Proposed Main Site beneath North Pilfrey Bridge, flow either side of the Stainforth and Keadby Canal. The watercourses flow via a sluice gate into the Three Rivers and flow on towards Keadby Pumping Station, a pumping station draining the Isle of Axholme located east of Station Road (B1392) Keadby Pumping Station connects with the River Trent via sluice gates and an outfall located approximately 100m south of the Waterborne Transport Offloading Area. These watercourses are classified as Main Rivers.
Hydrological	Stainforth and Keadby Canal	0km - The canal water abstraction would take water from the LWS and may use infrastructure adjacent to that installed for Keadby 2 Power Station
Hydrological	River Trent	1.3km east of Site
Transport	Scunthorpe to Doncaster passenger rail line	Nearest point on rail line is 0km from Site, located on Southern boundary on Site.

19.6. Development Design and Impact Avoidance

19.6.1. The EIA process aims to avoid, prevent, reduce or offset potential environmental effects through design and/or management measures. These are measures that are inherent in the design, construction, commissioning, operation and decommissioning of the Proposed Development (also known as embedded mitigation).

19.6.2. The following impact avoidance measures have either been incorporated into the design or are standard construction or operational practices. These measures have been considered during the impact assessment and will be secured as part of the Proposed Development and its regulatory overlay (i.e. CDM Regulations and / or COMAH Regulations) (HM Government, 2015a and 2015c respectively). Specific mitigation measures for each phase are also included in Section 19.7.

Design Phase

19.6.3. The Proposed Development design include a number of principles / philosophies and procedures with regard to process safety and safeguarding, with indicative proposals and layout plans submitted with the Application. The layout of the Proposed Development gives due consideration to Inherently Safer Design (ISD) principles with respect to both on-site and off-site receptors.

19.6.4. During the Proposed Development design stages, the future operational risks are being managed via a number of studies such as Site QRA, Consequence Modelling, HAZID studies, and HAZOP studies. These studies will continue to be carried out for the Proposed Development during the ongoing design process. This is a standard approach for the systematic identification of hazards and the development of barriers and other risk mitigation measures for preventing, or otherwise minimizing, hazardous scenarios to ALARP through appropriate design during the design stages.

Construction Phase

19.6.5. An **Outline Construction Environmental Management Plan (CEMP)** (**Application Document Ref. 7.4**) accompanies the Application. The Framework CEMP sets out how construction activities will be managed and controlled in compliance with accredited health and safety and environmental management systems, relevant legislation and environmental permits, consents and licenses. A final CEMP will be prepared by the Engineering, Procurement, and Construction (EPC)

Contractor(s) in accordance with the **Outline CEMP** (**Application Document Ref. 7.4**) prior to construction.

19.6.6. In compliance with the CDM Regulations 2015 (HM Government, 2015a) the Applicant / Operator will develop and provide pre-construction information to the EPC Contractor(s), as soon as is practicable with the formal appointment of the Principal Designer and Principal Contractor (normally the roles are undertaken by the appointed EPC Contractor).

19.6.7. In compliance with Regulation 6 of the CDM Regulations 2015 (HM Government, 2015a), a Notification of Construction Works will be submitted to the HSE prior to the commencement of construction. The Proposed Development EPC Contractor (Principal Designer and Principal Contractor) will comply with relevant health and safety legislation, i.e., Health and Safety at Work Act (1974) (HM Government, 1974).

19.6.8. The Principal Designer, or where there is no Principal Designer, the EPC Contractor(s), will ensure that a final Health and Safety File is prepared and handed to the Applicant. This will identify any environmental, health and safety information about the Proposed Development likely to be needed during any subsequent work activities.

19.6.9. The use of suitably experienced contractors, risk assessments, working method statements, operating procedures and personnel training will minimise the risk of accidental scenarios occurring during the Proposed Development construction. Atypical activities, which will be undertaken during construction, but not in normal operation, will be assessed as part of the risk assessment and mitigation processes. For example, fuelling of construction vehicles from temporary diesel storage areas will be subject to both procedural and infrastructure measures to prevent spillages of fuel.

19.6.10. The HSE Land Use Planning rules for new MAHP will ensure that pipe routes and their zoning (inner, middle and outer) do not compromise defined existing receptors. In addition, the HSE can influence the design of the pipelines (e.g. pipe wall thickness) to reduce the zones impact areas. Wayleaves / easements will be established around the pipeline route for safe operation as well as the planning zones. The Pipeline Safety Regulations 1996 (PSR) set out the requirements for planning, designing, constructing, operating, maintaining, decommissioning, and preventing damage to pipelines (HM Government, 2016). Pipeline operators have obligations under the Pipe Lines Act 1962 (HM Government, 1962) and PSR (HM Government, 1996a) to keep the pipelines safe and operating in

a manner that examination and maintenance of it can be carried out safely.

Commissioning Phase

19.6.11. Commissioning of the site will be undertaken in accordance with a Commissioning Plan. It is expected that the submission and approval of the Commissioning Plan would be a pre-operational condition of the Environmental Permit, from the EA. A separate report will be supplied to the HSE for approval as part of the COMAH Pre-Construction Notification Process (if required).

19.6.12. The commissioning phase will be covered by specific commissioning procedures moving into the operational phase.

Operation Phase

19.6.13. The Proposed Development will be operated in line with appropriate standards, whilst the Operator will implement and maintain an EMS which will be attested or certified to BS EN International Standards Organization (ISO)14001 (BSI, 2024). The EMS will outline the requirements and procedures needed to ensure that the Site is operating to the appropriate standard.

19.6.14. The facility will require an Environmental Permit, for the operation of the combustion plant, under the Environmental Permitting (England and Wales) Regulations 2016 (HM Government, 2016a). The Environmental Permitting regime, enforced by the EA, places several stipulations and requirements to be fulfilled to the satisfaction of the regulators, including the use of appropriate control and monitoring procedures, risk assessments, management systems and control measures; to minimize the risk of accidents occurring and to minimize the effects of any such accidents on off-site receptors as well as the operational workforce. The permit requires the approach to managing accidents and emergencies to be in accordance with the use of Best Available Techniques (BAT). The Applicant / Operator will identify and implement BAT requirements and conditions, to ensure that the design of the Proposed Development will be suitable for the Environmental Permit application.

19.6.15. Depending on the inventory of dangerous substances on Site, the Proposed Development may be a COMAH regulated facility. A calculation

is to be performed to confirm the COMAH status of the establishment and, if applicable, whether this will be at the Lower or Upper-Tier requirements.

COMAH applicability

19.6.16. If COMAH is applicable, the appropriate COMAH notifications will be submitted to the Competent Authority (CA), which comprises the HSE and EA. The pre-operational requirements are different for Lower and Upper-Tier facilities:

- Lower-Tier facilities require the implementation of a Safety Management System (SMS) and a Major Accident Prevention Policy (MAPP). The SMS must identify potential Major Accidents onsite, include an Environmental Risk Assessment, have procedural controls to manage / control / mitigate the risks and have an Internal Emergency Response Plan. The MAPP describes how the site will control the risks of a Major Accident.
- Upper-Tier facilities require the implementation of an SMS and MAPP, like a Lower-Tier facility, and the development and upkeep of a detailed Safety Case Report. The Safety Case Report will include appropriate risk assessments in line with the HSE Safety Report Assessment Manual (SRAM) criteria, which is used to demonstrate that the application is Duly Made to the regulator. The Safety Case Report will also include appropriate risk assessments in relation to Major Accidents to the Environment (MATTE) (Department for the Environment, Transport and Regions, 1999). The Safety Case Report is to be updated every five years after numerous site inspections by the HSE and EA. These facilities also need to provide information to external bodies for the development of external emergency pans.

Decommissioning Phase

19.6.17. The following embedded mitigation measures have been incorporated into the Proposed Development design. Detailed proposals and locations have been submitted with the DCO application:

- a Decommissioning Environmental Management Plan (DEMP) is secured by requirement on the **Draft DCO** (**Application Document Ref. 3.1**) and would be produced in advance to the Proposed Development being decommissioned. The DEMP would set out how decommissioning activities would be managed and controlled in compliance with accredited health and safety and environmental management systems, relevant legislation and environmental permits, consents and licenses;

- at the end of its operational life, decommissioning of the Proposed Development would see the removal of all above ground equipment down to ground level to enable future land re-use. It is assumed that all underground infrastructure would remain in-situ, with connection and access points being sealed / disconnected;
- all decommissioning activities will be controlled under The Dangerous Substances and Explosive Atmospheres Regulations (2002) (HM Government, 2002b), The Control of Substances Hazardous to Health Regulations (2002) (HM Government, 2002a) and The Construction (Design and Management) (CDM) Regulations (2015a) (HM Government, 2015a); or any equivalent legislation that has come into force by the time that the Proposed Development is to be decommissioned; and
- the use of suitably experienced contractors, risk assessments, working method statements, operating procedures and personnel training will minimise the risk of accident scenarios occurring during Proposed Development decommissioning.

19.7. Likely Impacts and Effects

19.7.1. Taking into account the embedded mitigation measures as detailed in Section 19.6 above, the potential impacts and effects of the Proposed Development have been assessed using the methodology, as detailed in Section 19.4 of this chapter and also within **ES Volume I Chapter 2:** Assessment Methodology (**Application Document Ref. 6.2**).

19.7.2. Considering the baseline conditions, the hazardous substances present and the identified likely activities during each phase of the Proposed Development, a long list of MA&D Risk Events has been prepared. This long list can be found in **ES Volume II Appendix 19A:** Major Accidents and Disasters Longlist (**Application Document Ref. 6.3**), along with justification for the shortlisting of the materials and activities presented in the following sections.

19.7.3. This section introduces the hazardous substances that are present at each stage of the Proposed Development, the potential risks that they pose and sets out the shortlisted MA&D scenarios.

Effects During the Construction Phase

Hazardous Substances to be used on Site

19.7.4. Diesel would be used during construction for fuel for vehicles, plant and, if required, mobile power generators. Diesel is classified as flammable and

harmful to the aquatic environment. A release of diesel, which if ignited, could cause harm to people via exposure to thermal radiation via a fire. A release which is unignited can cause harm to people if inhaled, ingested or exposed to skin. A release of diesel to the environment, such as the River Trent, could result in harm to flora and fauna. The quantities of diesel present will be kept to a minimum at a relatively minor level; to reduce the inherent severity of any risk of loss of containment. Procedurally, vehicles will be stationary with engines switched off and keys taken out of ignition (to prevent drive away) during filling. Any temporary bulk diesel storage tank will be located away from potential vehicular collisions and in an area where spills can be contained and recovered, and away from open drainage and open ground. Storage will have tank bunding (whether external or integral double skinned tanks), drip trays and tank level indication, with alarms where appropriate. Refuelling operations will take place over an impermeable surface, with the capability of capturing any spillages. Spill kits will be available for minor spill cleanup. Surface water drainage systems will be protected by spill covers or the use of suitable interceptor systems e.g., oil (fuel) / water separator (subject to site design). Measures to mitigate against accidental spillages during operation are set out in the **Outline CEMP** (**Application Document Ref. 7.4)**.

19.7.5. Liquid concrete could be present in significant quantities during construction of the Proposed Development. It may be produced in-situ from cement powder, which is classified as an irritant to skin as contact can cause alkali burns. This substance can harm the eyes and the respiratory system via inhalation of dust. If cement or wet concrete enters drains or watercourses, there is the potential for it to cause harm to the aquatic environment by increasing the pH of the water. The requirement for temporary protective drain covers to be available for use at drains at risk in the locality of cement civil works is detailed in the **Outline CEMP** (**Application Document Ref. 7.4)**. The surface water drainage system (subject to detailed design) is likely to have silt traps, which could capture small spillages. An Indicative Drainage Strategy is provided in Annex 3 of **ES Volume II Appendix 12A:** Flood Risk Assessment **(Application Document Ref. 6.3)** Consideration will be given to monitoring rainwater pH during construction, and this will be confirmed in a Surface Water Management Plan.

19.7.6. Acetylene, contained in compressed gas cylinders, may be present on site to carry out welding or cutting, e.g., trimming rebar, during construction. Acetylene is a flammable gas and a release could lead to fires/explosions if ignited, the thermal radiation from which could cause harm to people. A

release in enclosed areas can cause harm to people via asphyxiation. These materials will however be stored in relatively small quantities.

Review of Activities

19.7.7. Prior to the detailed design and construction of the Proposed Development, further Ground Investigation (GI) may be required to develop the detailed structural and civil design of the Proposed Development and validate the assumptions made in the initial Conceptual Site Model and Preliminary Risk Assessment (**ES Volume II Appendix 13A:** Phase 1 Desk Based Assessment Addendum (**Application Document Ref. 6.3)**). The GI will be carried out in accordance with appropriate specifications and standards as outlined in **ES Volume I Chapter 14:** Geology, Hydrogeology and Land Contamination (**Application Document Ref. 6.2**).

19.7.8. The impact of construction activities on human health, can be severe with permanent or very long-lasting effects. The **Outline CEMP (Application Document Ref. 7.4)** details standard practice to be applied. Additionally, mitigation specific to certain activities will be implemented, i.e. ground testing to ensure that it is stable and consultation with National Gas to ensure appropriate control measures are applied when working near pipelines.

Assessment of Shortlisted Major Accidents and Disasters Scenarios

19.7.9. Considering the baseline, the hazardous substances likely to be present, and the identified construction activities, a long list of MA&D Events has been prepared. This long list can be found in **ES Volume II Appendix 19A:** Major Accidents and Disasters Longlist **(Application Document Ref. 6.3)**, along with the justification for shortlisting the following MA&D Risk Events for further consideration, herein:

- ground instability;
- structural collapse/ accidental impact;
- utility strike / UXO strike;
- domino effects / explosion (Major Accident Hazard Sites)
- domino effects / explosion (Major Accident Hazard Pipelines)
- accidental vehicle impact;
- aircraft / drone strike; and
- vandalism.

19.7.10. Credible Scenarios for the Construction Risk Events are summarised in Table 19.5**.** The level of risk presented by all foreseeable Credible Scenarios has been assessed as Tolerable, taking into consideration the proposed mitigation measures, with the exception of Domino Effects

(Major Accident Hazard Sites C-4 and Major Accident Hazard Pipelines C-5), which are both assessed as Tolerable (if ALARP).

19.7.11. The statement of “Tolerable (if ALARP)” recognises that, at this stage of the Proposed Development design process, the mitigation measures considered are primarily the standard engineering design controls typically included within industrial facilities such as the Proposed Development. Specific embedded mitigation measures will be confirmed as the detailed design of the Proposed Development progresses and Consequence Modelling / QRA or similar detailed safety study(s) are produced to assess the level of residual risk.

Table 19.5: Scenarios Related to the Construction of the Proposed Development

Scenario Reference	Credible Scenario	Potential Impacts	Embedded Mitigation	Tolerability
C-1	**Ground Instability (GI)** Construction activity results in disturbance of manmade or naturally occurring ground related hazards. Vibration causes ground instability / collapse / settlement.	Localised collapse and subsidence of ground at the surface / surface settlement could lead to uncontrolled movement affecting objects / people / materials / plant / equipment, which could cause harm to persons on-site and / or lead to secondary impacts e.g., damage to utilities leading to explosion.	Application of safe working procedures is detailed within the **Outline CEMP** (**Application Document Ref. 7.4**) will minimise the risk of the scenario occurring. A ground investigation (GI), with appropriate testing, undertaken according to appropriate specifications and standards, will be carried out, to understand the potential risks and inform the construction methods to be used. To reduce risks associated with ground instability, there will be the use of industry standard construction methods / design features appropriate to the context of the Proposed Development.	Tolerable **(Not Significant)**
C-2	**Structural Collapse/ Accidental Impact** Construction activity results in damage to structures or impact with workers.	Collapse of new and existing buildings, structures and excavations via accidental impact with vehicles or via other failure mechanisms.	Structural engineering design for new structures, assessments of existing structures and temporary structures, such as excavations, will be in accordance with industry codes and standards.	Tolerable **(Not Significant)**

Scenario Reference	Credible Scenario	Potential Impacts	Embedded Mitigation	Tolerability
		Could cause harm / injury to persons on-site.	A final CEMP (to be secured by requirement on the **Draft DCO (Application Document Ref. 3.1)**) will be in place to control potential impacts from construction works. **An Outline Construction Traffic Management Plan (CTMP) (Application Document Ref. 7.5)** has been submitted as part of the DCO application.	
C-3	**Utility Strike / UXO (Unexplained Ordnance) Strike** Construction activity, such as excavation, accidentally impacts underground gas pipeline or UXO.	Impact on high-pressure gas pipelines could cause flammable gas to be released which, if ignited, can lead to injury / harm to persons within the vicinity. Potential damage to the environment via fire water run-off. Impact with utilities, i.e. a HV transmission cable would cause immediate harm to workers. Detonation of an UXO could cause injury / harm to nearby workers.	Preventative control measures could include, for example, ground penetrating radar (GPR) surveys and magnetometer surveys of the site and positive identification (ID) of all pipelines prior to construction, in accordance with PAS 128, and will be determined by the Principal Contractor. A final CEMP will be in place to control potential environmental impacts of construction works and will define control measures and procedures associated with excavations and avoidance of underground strikes in	Tolerable **(Not Significant)**

Scenario Reference	Credible Scenario	Potential Impacts	Embedded Mitigation	Tolerability
			accordance with the **Outline CEMP (Application Document Ref. 7.4)**. A desktop study on the risk of a UXO strike will be conducted. If the risk level is too great, then appropriate testing is to be undertaken, i.e., magnetometer scanning for UXO. Appropriate anti-strike protection (anti-collision guards) will be implemented, where identified, to protect existing and new aboveground pipework.	
C-4	**Domino Effects** **Major Accident Hazard Sites** An event on the construction site impacts and escalates to a neighbouring hazardous (COMAH) site. Alternatively, an event at a neighbouring hazardous (COMAH) site impacts the Proposed Development. Similarly Domino Effects are considered for sites with Hazardous Substances	Risk of escalation of fire / explosion / loss of chemical to nearby COMAH / HSC sites, due to an explosion or fire or loss of containment event on the construction site or from neighbouring sites. The site could be affected by fire / explosion / loss of chemical containment from neighbouring COMAH / HSC sites.	The likely COMAH status of the Proposed Development is to be determined. There are two COMAH facilities within the MA&D study area (5 km distance). Additionally there are 11 non-COMAH industrial sites, including 1 HSC site and the South Humberside passenger rail line. The rail line may be considered as a point of ignition. It is a requirement under COMAH legislation to consider potential Domino effects and to demonstrate	Tolerable – if ALARP **(Not Significant)**

Scenario Reference	Credible Scenario	Potential Impacts	Embedded Mitigation	Tolerability
	Consents (HSC), e.g. neighbouring facility with fertilizer storage.	Potential harm / injury to onsite workers.	that the risks are ALARP (As Low as Reasonably Practicable) and ensure that appropriate mitigation measures are incorporated into the design and operation to demonstrate ALARP. The Proposed Development (if COMAH) will be required to consider Domino effects as part of the final CEMP.	
C-5	**Domino Effects** **Major Accident Hazard Pipeline** An event on the construction site impacts and escalates to neighbouring MAH pipelines. Alternatively, an event at a neighbouring MAH pipeline impacts the Proposed Development.	Risk of escalation of fire / explosion / loss of chemicals to nearby MAH pipelines, due to an explosion or fire or loss of containment event on the construction site. The site could be affected by fire / explosion / loss of chemical containment from neighbouring MAH pipelines. Potential harm / injury to onsite workers in either of the events.	The COMAH status of the Proposed Development is to be determined. There are numerous MAH pipelines within the MA&D study area (5 km distance). It is a requirement under COMAH legislation to consider potential Domino effects and to demonstrate that the risks are ALARP, and ensure that appropriate mitigation measures are incorporated into the design, construction, commissioning and operation to demonstrate ALARP. The Proposed Development will be required to consider potential	Tolerable – if ALARP **(Not Significant)**

Scenario Reference	Credible Scenario	Potential Impacts	Embedded Mitigation	Tolerability
			Domino effects as part of the Construction.	
C-6	**Accidental Vehicle Impact** Construction equipment and vehicles could collide with workers on-site or on-site infrastructure.	A collision between construction vehicles and workers could cause injury / harm to persons on-site. Should vehicles be carrying construction materials such as diesel or concrete these may spill into the local area although the quantities of material will be limited such that significant environmental effects are not expected. Heavy loads (such as from construction vehicles) damaging buried pipelines or other underground high risk utilities leading to loss of containment and possible fire. Potential harm / injury to onsite workers.	A final CEMP will be in place to control potential impacts of construction works and will be developed in accordance with **Outline CEMP (Application Document Ref. 7.4)**. Appropriate access routes considering at-risk underground infrastructure shall be considered during construction and operation. A final Construction Traffic Management Plan (CTMP) will also be in place and will be in accordance with the **Outline CTMP (Application Document Ref. 7.5).**	Tolerable **(Not Significant)**
C-7	**Aircraft / Drone Impact**	Aircraft / drone incident results in harm to site personnel and /	The Proposed Development is located in an area close to Sandtoft	Tolerable **(Not Significant)**

Scenario Reference	Credible Scenario	Potential Impacts	Embedded Mitigation	Tolerability
	Impact on site infrastructure and / or site personnel from above aircraft / drones.	or member of public and / or damage to environmental receptor (ecological site, watercourse etc.).	Airfield. Consultation has been undertaken with relevant airports / Civil Aviation Authority (CAA) to manage interfaces and define appropriate control measures, including the need for aviation warning lighting to be fitted to tall construction machinery. This is secured by Requirement of the **Draft DCO (Application Document Ref 3.1)**. Existing stacks for Keadby 1 and Keadby 2 are already present (at 60m and 85m respectively). Should the need for taller construction machinery arise, the need for an aviation assessment should be reviewed in consultation with relevant consultation bodies including the Civil Aviation Authority. **(Application Document Ref 3.1)**.	
C-8	**Vandalism** A malicious destructive act onsite whereby material loss of containment could occur,	Harm to onsite personnel and / or members of the public off site from fire / explosion / loss of containment. Damage to	Appropriate security measures will be installed at the construction site, including CCTV, site security and fencing to prevent trespassers and mitigate this risk to ALARP as per	Tolerable **(Not Significant)**

Scenario Reference	Credible Scenario	Potential Impacts	Embedded Mitigation	Tolerability
	resulting in Fire / Explosion / Pollution	environmental receptors from loss of containment.	the O**utline CEMP (Application Document Ref. 7.4)**. During construction, the on-site chemicals inventory is limited (diesel etc.) and thus the severity of a potential incident would be limited.	

Effects during the Commissioning Phase

Hazardous Substances to be Used on Site

19.7.12. Commissioning of the Proposed Development will be undertaken in accordance with a Commissioning Plan. It is expected that the Commissioning Strategy / Plan will be a pre-operational condition of the Environmental Permit, for the EA, and it will also form part of the Construction Phase Plan under the CDM Regulations (HM Government, 2015a).

19.7.13. The Commissioning Strategy / Plan will cover the Hazardous Substances to be used onsite, most of which will be those to be used in operation of the Proposed Development and which are presented later in the Operational Phase preliminary assessment. There may be some chemicals introduced as a “one off” application, e.g., degreasing / cleaning chemicals for plant and equipment. The commissioning plan will address the hazards and risks of the hazardous substances during the commissioning phase.

Review of Activities

19.7.14. Plant and equipment will be commissioned in accordance with a Commissioning Plan. The plant and equipment will be brought on incrementally, using minimum process fluids where possible, until the operations are established. Once established, the operating capacity will be increased under tightly controlled conditions.

19.7.15. The Commissioning Plan will be underpinned by:

- appropriate task risk assessments;
- clearly defined criteria, beyond which the commissioning operations would be stopped; and
- industry recognised standard Commissioning Practices.

Assessment of Shortlisted Major Accidents and Disasters Scenarios

19.7.16. Considering the baseline, the hazardous substances likely to be present, and the identified commissioning activities, a long list of MA&D Events has been prepared. This long list can be found in **ES Volume II Appendix 19A:** Major Accidents and Disasters Longlist **(Application Document Ref. 6.3),** along with the justification for shortlisting the following MA&D Risk Events for further consideration herein:

- wet testing of equipment and charging storage vessels; and
- testing of critical instrument and control systems.

19.7.17. Credible Scenarios for the Commissioning Risk Events are summarised in Table 19.7. The level of risk presented by foreseeable Credible Scenarios has been assessed as Tolerable (if ALARP), taking into consideration the proposed mitigation measures.

19.7.18. The ranking of “Tolerable (if ALARP)” recognises that, at this stage of the Proposed Development design process, the mitigation measures considered are primarily the standard engineering design controls typically included within industrial facilities such as the Proposed Development. Specific embedded mitigation measures will be confirmed as the detailed design of the Proposed Development progresses and Consequence Modelling / QRA or similar detailed safety study(s) are produced to assess the level of residual risk.

Table 19.6: Scenarios related to the commissioning of the Proposed Development

Scenario Reference	Credible Scenario	Potential Impacts	Embedded Mitigation	Tolerability
COM-1	**Wet Testing of Equipment and Charging Storage Vessels** On first use of equipment, loss of containment possible if equipment is not clean or if equipment fails / has open route (i.e. untested open valve).	Equipment needs to be clean when brought online and charged / used for the first time. If equipment has not been sufficiently purged of construction materials, i.e. cleaning agents or flushing oils, there may be unwanted reactions or loss of containment from failure or open ends (e.g. valving error). Loss of containment has the potential to harm onsite personnel and / or members of the public off site and the environment.	A Commissioning Strategy / Plan will be required for sharing with the HSE and EA as part of both the COMAH (if applicable) and Environmental Permitting regimes. The strategy / plan will be underpinned with appropriate risk assessments and control measures, which reflect Standard Commissioning Practices. The plant and equipment will be brought on incrementally, using minimum process fluids where possible, until the operations are established. Design of the process systems to industry codes and standards. Pressure relief design to minimise the risk of mechanical failure and for safe venting or pressure lock-in of vessels to meet	Tolerable – if ALARP **(Not Significant)**

Scenario Reference	Credible Scenario	Potential Impacts	Embedded Mitigation	Tolerability
			ALARP. Compliance with the Pressure Equipment (Safety) Regulations 2016 (HM Government, 2016c) and the Pipeline Safety Regulations 1996 (HM Government, 1996a). Process monitoring, e.g. pressure and temperature, to allow controlled shutdown of operations. Gas detection at the Site and in the vicinity of high hazard areas. Detailed emergency plans will be produced for the Proposed Development in accordance with all applicable regulations.	

Scenario Reference	Credible Scenario	Potential Impacts	Embedded Mitigation	Tolerability
COM-2	**Testing of Critical Instrument and Control Systems** On first use of equipment, loss of containment possible if testing of equipment controls fail.	Failure of critical instrument and control systems during testing may lead to loss of containment of materials. Loss of containment has the potential to harm onsite personnel and / or members of the public off site and the environment.	A Commissioning Strategy / Plan will be required for sharing with the HSE and EA as part of both the COMAH (if applicable) and Environmental Permitting regimes. The Strategy / Plan will be underpinned by control loop / system testing plans, involving testing remotely (i.e., when not in service / duty). The plant and equipment will be brought on incrementally, using minimum process fluids where possible, until the operations are established. Testing of critical instrumentation and control systems may be carried out at lower set points (within safe operating limits of equipment) to reduce risk.	Tolerable – if ALARP **(Not Significant)**

Effects during the Operational Phase

Hazardous Substances to be Used on Site

19.7.19. The key hazardous substances, which will be present within the Proposed Development during operation are summarised in **Table 19.7**, along with their properties and arrangements for storage and use. In order to reduce the risks of contamination to processes and surface water, all liquid chemicals stored on site will be kept in bunded controlled areas. These areas will have a containment volume of either 110% of the greatest tank storage capacity or 25% of the total storage where multiple tanks and containers are located, and be appropriately segregated.

19.7.20. Smaller quantities of other potentially dangerous and / or hazardous materials may also be present on-site. These substances will not be expected to initiate or exacerbate MA&D but could be harmful in the event of a major accident that causes loss of containment. For example, if hazardous substances were released during a fire event, due to the failure of storage vessels, which resulted in the hazardous substances being present in the firewater runoff. These smaller quantities will be managed under embedded practices such as risk assessments and Management of Change to ensure their use will not initiate or contribute to a MA&D.

Table 19.7: Hazardous Substances Likely to be Present during the Operation of the Proposed Development

Substance	Use	Transportation / Storage	Hazards	Potential Effects
Process Gases				
Natural gas (comprising a mixture of hydrocarbons; primarily methane (CH_4)) - Gas	Fuel for CCGT power plant.	Natural gas will be imported from the National Grid via a dedicated pipeline. No onsite gas storage.	Extremely flammable. A qualifying substance under COMAH (a named dangerous substance in the regulations).	Fire and / or explosion. Potential for onsite harm to workforce and offsite members of the public
Hydrogen (H_2) - Gas	Fuel for CCGT power plant.	Hydrogen delivery infrastructure to the Site to be defined at a later date. No on-site bulk fuel storage.	Extremely flammable. A qualifying substance under COMAH (a named dangerous substance in the regulations).	Fire and / or explosion. Potential for onsite harm to workforce and offsite members of the public
	Turbine cooling (for GT and ST for CCGT operation)	Hydrogen to be stored within fixed cylinder banks skid to cool down turbine generator. Minimised quantity of storage associated with Turbine Cooling supply (either as bottle banks or tube trailer array)		

Substance	Use	Transportation / Storage	Hazards	Potential Effects
Carbon dioxide (CO_2) - Gas	Purging of electrical generators for maintenance purposes.	Exact quantities are unknown at this stage. Anticipated to be small. Quantity to be confirmed as the design progresses.	Asphyxiant. Not a qualifying substance under COMAH.	Asphyxiant. Harm to people via inhalation if exposed to gas (where oxygen in air is displaced/reduced).
Process Materials				
Urea Solution - Liquid	Option to be used within SCR abatement system to reduce NOx emissions from combustion equipment.	Will be imported by road tanker and stored in a tank as part of the CCGT facility. Storage quantities to be defined, however quantity at this stage is not considered sufficient to be a MA&D..	Toxic to aquatic life. Not a qualifying substance under COMAH.	Harm to the environment if released to ground / water / groundwater. Potential leaching effects. Can decompose to Ammonia on heating.
Aqueous ammonia (NH_3) - Liquid	Option to be used within SCR abatement system to reduce NOx emissions from combustion equipment. Also may be used as an alkalizing agent as part	Ammonia solution will be imported by road tanker and stored in a tank as part of the CCGT facility. Storage quantities to be defined, however quantity at this	Very toxic to aquatic life. Harmful if swallowed. Ammonia vapours are flammable Causes skin burns and eye damage. May cause respiratory irritation.	Harm to the environment if released to ground / water / groundwater. Harm to people via inhalation if exposed to vapour or in contact with skin or eyes.

Substance	Use	Transportation / Storage	Hazards	Potential Effects
	of power plant treatment chemicals	stage is not considered sufficient to be a MA&D. Ammonia tank design shall consider flammability risk, as well as measures to reduce fugitive emissions from storage.	A qualifying substance under COMAH (as an environmental hazard dangerous substance in the regulations).	
Selective Catalytic Reduction (SCR) Catalyst - Solid	Catalyst used for abating combustion plant emissions, i.e., NOx reduction, in the CCGT using ammonia solution (or urea)	SCR catalyst will be imported by road tanker. Catalyst will be charged to the CCGT exhaust system. Inventory to be confirmed when catalyst chosen.	Toxicity to be confirmed pending selection of catalyst.	To be confirmed when catalyst confirmed, but will be limited to charging solid catalyst operations and emptying of catalyst vessel.
Liquid Fuel				

Substance	Use	Transportation / Storage	Hazards	Potential Effects
Diesel	Fuel for backup generators, and diesel powered firewater pump	Diesel will be imported by road tanker and stored on-site at various locations, near point of use. Inventory is likely to be small for emergency systems - volumes and locations to be confirmed	Flammable. Toxic to the aquatic environment with long lasting effects (chronic). A qualifying substance under COMAH (a named dangerous substance in the regulations).	Harm to people on-site in the event of release and / or fire. Harm to environment if released.
Utilities and Service Chemicals				
Sulphuric acid (H_2SO_4)	Within the cooling water package for pH correction	Sulphuric acid will be imported by road tanker and a limited quantity will be stored in a chemical storage facility on-site. Storage quantities to be defined, however quantity at this stage is not considered sufficient to be a MA&D. Measures to be applied to prevent or reduce likelihood of incorrect	Causes severe skin burns and eye damage. Exothermic reaction if acid and base chemicals are mixed (eg. Sulphuric acid and Sodium Hydroxide).	Short term harm to the environment if released to ground / water / groundwater. Harm to people via inhalation if in contact with skin or eyes.

Substance	Use	Transportation / Storage	Hazards	Potential Effects
		unloading of acid (eg. To wrong tank) to prevent risk of harmful reaction.		
Phosphoric Acid / Phosphate (H_3PO_4)	Within the water treatment plant chemicals.	Exact quantities are unknown at this stage. To be confirmed as the design progresses, however quantity at this stage is not considered sufficient to be a MA&D. Measures to be applied to prevent or reduce likelihood of incorrect unloading of acid (eg. To wrong tank) to prevent risk of harmful reaction.	Causes severe skin burns and eye damage. Exothermic reaction if acid and base chemicals are mixed (eg. Phosphoric acid and Sodium Hydroxide).	Short term harm to the environment if released to ground / water / groundwater. Harm to people via inhalation if in contact with skin or eyes.
Sodium Hydroxide (NaOH)	Within the water treatment plant chemicals.	Exact quantities are unknown at this stage. To be confirmed as the design progresses, however quantity at this stage is not considered sufficient to be a MA&D. Measures to be applied to prevent or reduce	Causes severe skin burns and eye damage. Risk of exothermic reaction if acid and base chemicals are mixed (eg. Sulphuric acid and Sodium Hydroxide).	Short term harm to the environment if released to ground / water / groundwater. Harm to people via inhalation if in contact with skin or eyes.

Substance	Use	Transportation / Storage	Hazards	Potential Effects
		likelihood of incorrect unloading of base (eg. To wrong tank) to prevent risk of harmful reaction.		
Oxygen Inhibitor - Liquid	Power cooling water plant treatment chemicals	To be confirmed, however quantity at this stage is not considered sufficient to be a MA&D.	Oxidiser which can intensify combustion – fire and explosion hazard	To be confirmed when inhibitor confirmed.
Hardness stabilizer - Liquid	Power cooling water plant treatment chemicals	To be confirmed, however quantity at this stage is not considered sufficient to be a MA&D.	Toxic substance and also toxic to the aquatic environment.	To be confirmed when hardness stabiliser confirmed.
Biocide	In the cooling water in cooling towers and firewater tank dosing unit.	Exact quantities are unknown at this stage. To be confirmed, however quantity at this stage is not considered sufficient to be a MA&D.	Hazards to be confirmed following confirmation of specific chemical to be used (and if it is required).	To be confirmed as design progresses and hazards identified.

Substance	Use	Transportation / Storage	Hazards	Potential Effects
Corrosion Inhibitor	In the cooling water in cooling towers and firewater tank dosing unit.	Exact quantities are unknown at this stage. To be confirmed, however quantity at this stage is not considered sufficient to be a MA&D.	Hazards to be confirmed following confirmation of specific chemical to be used (and if it is required).	To be confirmed as design progresses and hazards identified.
Cleaning Chemicals	Routine cleaning and maintenance.	Exact quantities are unknown at this stage. To be confirmed, however quantity at this stage is not considered sufficient to be a MA&D.	Hazards to be confirmed following confirmation of specific chemical to be used (and if it is required).	To be confirmed as design progresses and hazards identified.
Bio dispersants	For cooling tower chemicals	Exact quantities are unknown at this stage. To be confirmed, however quantity at this stage is not considered sufficient to be a MA&D.	Hazards to be confirmed following confirmation of specific chemical to be used (and if it is required).	To be confirmed as design progresses and hazards identified.
Oil and lubricants (compressors)	Air compressor and lube oil skid.	Exact quantities are unknown at this stage. To be confirmed, however quantity at this stage is not considered sufficient to be a MA&D.	Hazards to be confirmed following confirmation of specific chemical to be used (and if it is required).	To be confirmed as design progresses and hazards identified.

Review of Activities

19.7.21. The Proposed Development will consist of a CCGT plant, generating up to 910 MW electrical output. The operation of the Proposed Development is summarised in **ES Volume I Chapter 4** (**Application Document Ref. 6.2**).

19.7.22. Natural gas will be supplied via a tie-in to the existing high pressure Natural Gas transmission network on the Site. It is currently anticipated that a minimum off-take connection will be constructed, and natural gas will be transferred via a below ground pipeline within the Main Site from a new natural gas Above Ground Installation (AGI) and natural gas receiving area, where the gas would be metered and conditioned to that required for the Proposed Development.

19.7.23. Alternatively, or in addition, hydrogen will be supplied via a tie-in to a new hydrogen transmission network. It is currently anticipated that a minimum off-take connection will be constructed, and hydrogen will be transferred via a below ground pipeline within the Main Site from a new hydrogen AGI and hydrogen receiving area, where the hydrogen would be metered and conditioned to that required for the Proposed Development. If the Proposed Developed is operating in a mode which combusts a mixture of natural gas and hydrogen, these gases would also be conditioned in a blending station.

19.7.24. Following combustion in the gas turbine with dry low NOx (DLN) burners, the hot product gases expand across the blades of the turbine causing it to rotate and drive an electrical generator. The gas turbine exhaust gases are then passed through the Heat Recovery Steam Generator (HRSG) to recover the useful heat in order to produce steam (at various pressures) which is then used to generate further power via a separate steam turbine.

19.7.25. The flue gases may then need to be treated within a Selective Catalytic Reduction (SCR) unit to reduce the NOx levels to the required emissions limits. The SCR will be supplied with aqueous ammonia (or urea solution) to reduce the flue gas NOx, which will be converted into nitrogen and water vapour in the flue gas.

19.7.26. Steam exhausting from the steam turbine will be cooled and condensed, with the condensate returned to the steam-water cycle of the HRSG for continued re-use. Water used within this steam / water cycle will be dosed to control pH and dissolved oxygen (O_2) so as to limit corrosion in the plant and equipment. Water treatment chemicals will also be used to prevent the build-up of residual dissolved solids in pipework (anti-scaling / anti

fouling chemicals) and also to prevent corrosion (corrosion inhibitor chemicals).

19.7.27. It will be necessary to intermittently purge a small amount of the boiler water (known as 'blowdown') to the cooling tower basin. Blowdown water removed from the cycle will be replaced with fresh demineralised water. The volume of water treatment chemicals used onsite is small and will not cause a MA&D.

19.7.28. The condensation of steam exiting the steam turbine will be achieved using cooling water from the wet / dry (hybrid) cooling towers. The cooling towers are specifically designed to minimise, as far as is possible, the formation of visible plumes, through plume abatement technologies although some plume generation may occur in high humidity / low temperature weather conditions.

19.7.29. An emergency generator is required in order to provide a short-term source of electricity, in the event of a simultaneous loss of site power generation and external power supply, to provide power for essential and non-essential services for up to 72 hours until external power can be re-established.

19.7.30. Considering the baseline, the hazardous substances likely to be present, and the identified operational activities, a long list of MA&D Events has been prepared. This long list can be found in **ES Volume II Appendix 19A:** Major Accidents and Disasters Longlist **(Application Document Ref. 6.3),** along with the justification for shortlisting the following MA&D Risk Events for further consideration herein:

- the release of natural gas – fire and / or explosion;
- the release of hydrogen – fire and / or explosion
- domino effects with neighbouring Major Accident Hazard Sites;
- domino effects with neighbouring Major Accident Hazard Pipelines;
- flooding;
- aircraft / drone strike; and
- vandalism.

19.7.31. Credible Scenarios for the Operation Risk Events are summarised in **Table 19.8**. The level of risk presented by all foreseeable Credible Scenarios has been assessed as "Tolerable - if ALARP", taking into consideration the proposed mitigation measures, with the exception of

Aircraft / Drone Strike (O-6) and Vandalism (O-7), which are ranked as "Tolerable".

19.7.32. The ranking of "Tolerable – if ALARP" recognises that, at this stage of the Proposed Development design process, the mitigation measures considered are primarily the standard engineering design controls typically included within industrial facilities such as the Proposed Development. Specific embedded mitigation measures will be confirmed as the detailed design of the Proposed Development progresses and Consequence Modelling / QRA or similar detailed safety study(s) are produced to assess the level of residual risk.

Table 19.8: Scenarios Related to the Operation of the Proposed Development

Scenario Reference	Credible Scenario	Potential Impacts	Embedded Mitigation	Tolerability
O-1	**Fire and / or Explosion of Natural Gas** Fire due to loss of containment of natural gas (e.g., by mechanical failure or impact damage) from supply pipeline or process / combustion equipment. Explosion from ignition of escaped natural gas.	Fire and / or explosion could result in significant harm to people on-site. There is also the potential for harm to people and businesses off-site, such as radiant heat burns and impact injuries from explosions. The environmental impact of a major fire could affect the nearby local environmental receptors vis the Humber Estuary SSSI, RAMSAR etc.as a result of run-off of uncontained firewater. It is unlikely that radiant heat or smoke would have a significant impact on members of the public, considering the location of the site. It is unlikely that this type of accident could impact listed buildings or other heritage sites based on distance. Firewater run-off reaching areas of unmade ground could contain contaminants which would be potentially	Design of the natural gas systems is to industry codes and standards and will include the separation and segregation of pipework and equipment containing natural gas; inventory isolations and Integrated Control and Safety Systems (ICSS); and minimising operator complexity of operating the equipment. Locating occupied buildings away from hazardous zones, where practicable, and designing occupied buildings within hazardous zones, such as the control room, to withstand a hazardous event and protect the people within for a specific period of time, usually one hour. Compliance with the Pressure Equipment (Safety) Regulations 2016 (HM Government, 2016c) and the PSR (1996) (HM Government,1996a) . Selection of buried pipeline routes away from sensitive receptors (where practicable), increased depth of cover in areas of higher risk, use of existing established pipe racks and the construction of safety systems to prevent pipeline damage, such as the installation of collision barriers. Leak / natural gas detection systems at the Site in the vicinity of high hazard areas. Fire detection and fire protection systems will be installed, including passive and active fire suppression systems. Selection and use of intrinsically safe equipment to reduce likelihood of ignition. The Proposed Development will be designed to contain firewater runoff and prevent material reaching unmade ground or other environmental receptors.	Tolerable (if ALARP) - **(Not Significant)**

Scenario Reference	Credible Scenario	Potential Impacts	Embedded Mitigation	Tolerability
		harmful to ground and groundwater.	Detailed emergency plans will be produced for the Proposed Development in accordance with applicable regulations.	
O-2	**Fire and / or Explosion Hydrogen** Fire due to loss of containment of H_2 (e.g., by mechanical failure or impact damage) from hydrogen pipeline or process equipment. Explosion following release of H_2.	Immediate ignition of H_2 gas would lead to a localised flash or jet fire, depending on gas volume and pressure. Delayed ignition could lead to an explosion and / or fire. Fire and / or explosion could result in significant harm to people on-site. There is also the potential for harm to people and businesses off-site, such as impact injuries from debris from explosions.	Design of the H_2 systems, shall be to industry codes and standards, including the selection of compatible materials for storage vessels, pipework and process equipment; separation and segregation of pipework and equipment containing H_2; inventory isolations and ICSS; and minimising operator complexity of operating equipment. Locating occupied buildings away from hazardous zones and designing occupied buildings within hazardous zones, to withstand a hazardous event and protect the people within for a specific period of time, usually one hour. Compliance with the Pressure Equipment (Safety) Regulations 2016 (HM Government, 2016c) and the Pipelines Safety Regulations 1996 (HM Government, 1996a). The selection of buried pipeline routes away from sensitive receptors (where practicable), increased depth of cover in areas of higher risk, use of existing established pipe racks and the construction of safety systems to prevent pipeline damage, such as the installation of collision barriers. Leak / natural gas detection systems at the Site in the vicinity of high hazard areas. Fire detection and fire protection systems will be installed, including passive and active fire suppression systems. Selection and use of intrinsically safe equipment to reduce the likelihood of ignition. The Proposed Development will be designed to contain firewater runoff and prevent material reaching unmade ground or other environmental receptors.	Tolerable (if ALARP) - **(Not Significant)**

Scenario Reference	Credible Scenario	Potential Impacts	Embedded Mitigation	Tolerability
			Detailed emergency plans will be produced for the Proposed Development in accordance with applicable regulations. Appropriate siting of utility hydrogen storage for hydrogen cooling. Appropriate venting, isolation, fire and gas detection measures shall be implemented.	
O-3	**Domino Effects** **Major Accident Hazard Site or Hazardous Substances Consented Site** An event on the operational site impacts and escalates to a neighbouring hazardous (COMAH) site. Alternatively, an event at a neighbouring hazardous (COMAH) site impacts the Proposed Development. Similarly Domino Effects are considered for sites with Hazardous Substances Consents (HSC), e.g. neighbouring facility with fertilizer storage.	Risk of escalation of fire / explosion / loss of chemical containment to nearby COMAH / HSC sites, due to an explosion or fire or loss of containment event on the operational site. The site could be affected by fire / explosion / loss of chemical containment from neighbouring COMAH / HSC sites. Potential harm / injury to onsite workers as well as member of the public	The likely COMAH status of the Proposed Development is to be determined during the detailed design. There are two COMAH facilities within the MA&D Study Area (5km distance). It is a requirement under COMAH legislation to consider potential Domino effects and to demonstrate that the risks are ALARP. Putting in the appropriate mitigation measures in design and operation. The Proposed Development will have to assess the potential for Domino effects either being the initiator or the receptor of an event if COMAH. Appropriate mitigation measures will need to be implemented such that the Principles of ALARP are upheld to minimise risk. It should be noted that neighbouring COMAH sites will have to review and implement changes, where required, as part of their Domino effects assessment. The HSE will review the Domino assessments to ensure that the risks are tolerable and that ALARP has been applied.	Tolerable (if ALARP) - **(Not Significant)**
		Risk of incident at adjacent Keadby Windfarm could lead to major accident at the Site e.g. fire and/or explosion from	Risk assessment has informed the inclusion of an assumed exclusion zone of 140 m from the base of the turbine (1.5 x mast height) to mitigate the risk of ice throw / a turbine falling onto the Proposed Main Site.	

Scenario Reference	Credible Scenario	Potential Impacts	Embedded Mitigation	Tolerability
		an ice throw, blade fragment, mast falling etc. The Proposed Development lies in close proximity to PD Port Services Keadby site where it is noted that a HSC for ammonium nitrate- based fertilisers (PA/2014/0176) was in place but is reported to be withdrawn. Upper and lower tier COMAH sites lie at greater distances. Risk of accidental release of dangerous substances (if such substances are present), resulting in fire and/ or explosion at neighbouring industrial facilities.	The site will have Emergency Plans in place covering offsite incidents that could affect site personnel or plant and equipment, e.g. initiate site partial or full shutdown, staff relocation to safe locations (e.g. safe from fumes / smoke).	
O-4	**Domino Effects** **Major Accident Hazard Pipeline** An event on the operational site impacts and escalates to a neighbouring MAH pipeline. Alternatively, an event at a neighbouring MAH pipeline impacts the Proposed Development.	Risk of escalation of fire / explosion / loss of chemical containment to nearby pipelines sites, due to an explosion or fire or loss of containment event on the operational site. The site could be affected by fire / explosion / loss of chemical containment from neighbouring pipelines.	The COMAH status of the Proposed Development is to be determined during detailed design. There are numerous MAH pipelines within the MA&Ds Study Area (5km distance). It is a requirement under COMAH legislation to consider potential Domino effects and to demonstrate that the risks are ALARP. Putting in the appropriate mitigation measures in design and operation. The Proposed Development will have to assess the potential for Domino effects, either being the initiator or the receptor of an event, if COMAH status is achieved. Appropriate mitigation measures will need to be implemented such that the Principles of ALARP are upheld to minimise risk.	Tolerable (if ALARP) - **(Not Significant)**

Scenario Reference	Credible Scenario	Potential Impacts	Embedded Mitigation	Tolerability
		Potential harm / injury to onsite workers as well as member of the public	It should be noted that neighbouring COMAH hazardous pipelines will have to review and implement changes, where required, as part of their Domino effects assessment.	
O-5	**Flooding** A tidal or river flood event or storm surge causes the Proposed Development to flood. Flooding is considered an initiating event under COMAH.	Tidal sources: The Site is at a 'low' risk of flooding from tidal and fluvial sources, groundwater and surface water run off to the proposed development. Overall, the risk of flooding from artificial waterbodies including the Stainforth and Keadby Canal is considered to be 'low'. There is therefore a low risk of floodwaters mobilising onsite materials and the potential contaminants on the Site.	A number of embedded mitigation measures have been outlined for the construction, operation and decommissioning phases of the Proposed Development. These are outlined in detail in **ES Volume I Chapter 12:** Water Environment and Flood Risk (**Application Document Ref.6.2.12).** In order to protect against the residual risk of breach and the future risk from defence overtopping, the critical operational equipment and infrastructure will be raised above the modelled breach level during the 0.5% AEP plus climate change tidal event. Refer to Section 19.6 for design and impact avoidance measures that would be implemented by the contractor during construction to reduce this risk. Measures to be agreed with EA.	Tolerable (if ALARP) - **(Not Significant)**
O-6	**Aircraft / Drone Impact** Impact on site infrastructure and/or site personnel from above aircraft / drones.	Aircraft / drone incident results in harm to site personnel and / or member of public and / or damage to environmental receptor (ecological site, watercourse etc.).	The Proposed Development is located in an area close to Sandtoft Airfield. Consultation has been undertaken with relevant airports / Civil Aviation Authority (CAA) to manage interfaces and define appropriate control measures, including the need for aviation warning lighting to be fitted to tall structures. Existing stacks for Keadby 1 and Keadby 2 are already present (at 60m and 85m respectively). Should the need for taller structures arise, the need for an aviation assessment should be reviewed in consultation with relevant consultation bodies including the Civil Aviation Authority.	Tolerable **(Not Significant)**

Scenario Reference	Credible Scenario	Potential Impacts	Embedded Mitigation	Tolerability
O-7	**Vandalism** A malicious destructive act onsite whereby material loss of containment could occur, resulting in Fire / Explosion / Pollution	Harm to onsite personnel and / or members of the public off site from fire / explosion / loss of containment. Damage to environmental receptors from loss of containment.	Appropriate security measures will be installed at the operating site, including CCTV, site security and fencing to prevent trespassers and mitigate this risk as per the COMAH and EPR permit security requirements. During operation, the on-site chemicals inventory is small, reducing the severity of a potential incident of material release.	Tolerable - **(Not Significant)**

Effects during the Decommissioning Phase

Hazardous Substances to be Used on Site

19.7.33. Potential MA&D Disasters scenarios during decommissioning of the Proposed Development would involve the same hazardous materials as encountered in the operational phase, however this phase will also generate waste materials, which will be recycled wherever possible and managed in accordance with the legislation applicable at the time. The design has been developed in line with principles of circular economy to ensure that it minimises the amount of waste materials. For further information regarding waste management, refer to **ES Volume I Chapter 20:** Waste and Materials **(Application Document Ref. 6.2)**.

Review of Activities

19.7.34. Decommissioning would involve a significant process of dismantling above and below-ground structures and the cleaning, removal or capping off of pipelines and isolation of process vessels prior to dismantling. This activity has the potential for an accidental loss of containment of process gases (natural gas and hydrogen) and liquids.

Assessment of Shortlisted Major Accidents and Disasters Scenarios

19.7.35. Considering the baseline, the hazardous substances likely to be present, and the identified decommissioning activities, a long list of MA&D Events has been prepared. This long list can be found in **ES Volume II Appendix 19A:** Major Accidents and Disasters Longlist **(Application Document Ref. 6.3)**, along with the justification for shortlisting the following MA&D Risk Events for further consideration herein:

- the release of residual inventory of operational phase substances – fire / explosion with gases and environmental contamination by liquids.

19.7.36. Credible Scenarios for Decommissioning Risk Events are summarised in **Table 19.9**. The level of risk presented by all foreseeable Credible Scenarios has been assessed as Tolerable, taking into consideration the proposed mitigation measures. This recognises that the Decommissioning Plan will need to demonstrate BAT (under EPR) for the removal of materials from site, so as to remove the residual risk, and effective health and safety management under the CDM Regulations, for any site demolition operations, to the satisfaction of EA and the HSE.

Table 19.9: Scenarios Related to the Decommissioning of the Proposed Development

Scenario Reference	Credible Scenario	Potential Impacts	Embedded Mitigation	Tolerability
D-1	**Release of Residual Inventory of Operational Phase Substances** **Fire / Explosion – Gases** **Environmental Contamination - Liquids** Decommissioning activity results in a loss of containment of gas, or liquid (diesel) as a result of failure to empty, clean and purge process systems.	A release of natural gas could cause a fire / explosion that could cause harm / injury to site personnel as well as member of the public. A release of liquid diesel could impact upon the environmental receptors.	A Decommissioning Plan will be required for the Environmental Permit surrender and also the CDM notification to the HSE. All decommissioning activities will be controlled as applicable in relation to The Dangerous Substances and Explosive Atmospheres Regulations (2002a) (HM Government, 2002); The Control of Substances Hazardous to Health Regulations (2002b) (HM Government, 2002) and The Construction (Design and Management) (CDM) Regulations (2015a) (HM Government, 2015); or any equivalent legislation at the time of decommissioning. Risk assessments will be produced prior to decommissioning activities, which are only to be carried out by suitably trained and experienced personnel. Activities with a high level of risk, such as hot work (activities such as welding or using tools where there is a risk of ignition in a hazardous area), will be strictly controlled. Job method statements will include gas testing systems to ensure that plant and equipment have been fully vented and are clean prior to decommissioning. Compliance with safety legislation by the implementation of controls is considered to be sufficient to reduce risks to a level which is tolerable.	Tolerable - **(Not Significant)**

19.8. Mitigation, Monitoring and Enhancement Measures

19.8.1. The assessed Credible Scenarios identified for each phase of the Proposed Development have all been assessed as having a level of risk which is Tolerable or Tolerable (if ALARP). The embedded mitigation measures are considered to be sufficient (at this stage of the Proposed Development design) and secondary mitigation is not proposed at this point, however further measures will be defined as the Proposed Development design is further progressed. An initial Fire and Explosion Risk Assessment (for the pre-FEED design) has been prepared, and the results indicate that the design is tolerable and ALARP . Further detailed analysis may be carried out including detailed QRA and/or consequence modelling assessments to determine whether the level of residual risk to people, both on-site and off-site, and to the environment, is to acceptable industry standards and ALARP and compliant with relevant legislation.

19.9. Limitations or Difficulties

19.9.1. This assessment is based on the construction, preliminary design, process and decommissioning information that is currently available and early appraisal of potential hazards.

19.9.2. For the purposes of the assessment the construction phase includes enabling and demolition works required to facilitate the Proposed Development.

19.10. Summary of Likely Significant Residual Effects

19.10.1. It is considered that all MA&D Risk Events identified during each stage of the Proposed Development will be Tolerable or Tolerable - if ALARP and therefore the residual effects are **Not Significant**.

19.10.2. An assessment of cumulative effects with other proposed developments that could interact with the effects of this Proposed Development will be carried out in the final ES, when the short-list of other developments has been finalised, as detailed in **ES Volume I Chapter 21** (**Application Document Ref. 6.2**). This chapter will also assess the in-combination effects of multiple aspects on one receptor. It should be recognised that, if the Proposed Development is subject to COMAH, that Domino effects will be considered within the COMAH considerations with the HSE.

19.11. References

- BGS, 2024; GeoIndex (onshore) [online]. Available at: https://www.bgs.ac.uk/map-viewers/geoindex-onshore/ (Accessed 25/08/2025)
- BSI, 2024; BS EN ISO 14001:2015+A1:2024 Environmental management systems – Requirements with guidance for use.
- BSI, 2024; BS EN ISO 45001:2023+A1:2024 Occupational health and safety management systems. Requirements with guidance for use.
- BSI, 2018; BS ISO 31000:2018 Risk Management – Guidelines.
- Cabinet Office, 2012; Emergency Preparedness Guidance on Part 1 of the Civil Contingencies Act 2004 [online]. Available at: https://www.gov.uk/government/publications/emergency-preparedness (Accessed 25/08/2025)
- CDOIF, 2017; Guideline – Environmental Risk Tolerability for COMAH Establishments v2.0 [online]. Available at: https://www.sepa.org.uk/media/219154/cdoif_guideline__environmental_risk_assessment_v2.pdf (Accessed 25/08/2025)
- DEFRA, 2011; Guidelines for Environmental Risk Assessment and Management Green Leaves III [online]. Available at: https://assets.publishing.service.gov.uk/media/5a79d20540f0b66d161ae5f9/pb13670-green-leaves-iii-1111071.pdf (Accessed 25/08/2025)
- Department for the Environment, Transport and Regions, 1999; Guidance on the Interpretation of Major Accident to the Environment for the Purpose of the COMAH Regulations [online]. Available at: https://www.sepa.org.uk/media/219153/detr-guidance-1999.pdf (Accessed 25/08/2025)
- DESNZ, 2023; Overarching National Policy Statement for Energy (EN-1) [online]. Available at: https://assets.publishing.service.gov.uk/media/65a7864e96a5ec0013731a93/overarching-nps-for-energy-en1.pdf (Accessed 25/08/2025)
- DESNZ, 2023; National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) [online]. Available at: https://assets.publishing.service.gov.uk/media/655dc2d4046ed4000d8b9dd9/nps-natural-gas-supply-infrastructurepipelines-en4.pdf (Accessed 25/08/2025)
- DESNZ, 2023; National Policy Statement for Electricity Networks Infrastructure (EN-5) [online]. Available at: https://assets.publishing.service.gov.uk/media/655dc25e046ed400148b

9dca/nps-electricity-networks-infrastructure-en5.pdf (Accessed 25/08/2025)

- EC, 1996; Council Directive 96/82/EC of 9 December 1996 on the control of major-accident hazards involving dangerous substances [online]. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31996L0082 (Accessed 25/08/2025)
- EC, 2011; Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification) Text with EEA relevance [online]. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32011L0092 (Accessed 25/08/2025)
- EC, 2014; Environmental Impact Assessment Directive 2014/52/EU393 [online]. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014L0052 (Accessed 25/08/2025)
- EC, 2021; Overview of natural and man-made disaster risks the European Union may face. Luxembourg: Publications Office of the European Union
- Envirocheck, 2020 [online]. Landmark EnviroCheck Report
- Google, 2024; *Maps* [online]. Available at: https://www.google.co.uk/maps (Accessed 25/08/2025)
- HM Government, 1962. Pipe-Lines Act 1962 (Regnal.10_and_11_Eliz_2) [online]. Available at: https://www.legislation.gov.uk/ukpga/Eliz2/10-11/58/contents
- HM Government, 1974; The Health and Safety at Work etc. Act 1974 (SI 1974/37) [online]. Available at: https://www.hse.gov.uk/legislation/hswa.htm (Accessed 25/08/2025)
- HM Government, 1984; The Occupier's Liability Act (SI 1984 No. 3) [online]. Available at: https://www.legislation.gov.uk/ukpga/1984/3/section/1/enacted (Accessed 25/08/2025)
- HM Government, 1991; The Fertilisers Regulations 1991 [online]. Available at: https://www.legislation.gov.uk/uksi/1991/2197/contents (Accessed 25/08/2025)
- HM Government, 1992; The Workplace (Health, Safety and Welfare) Regulations 1992 (SI 1992/3004) [online]. Available at: https://www.legislation.gov.uk/uksi/1992/3004/contents/made (Accessed 25/08/2025)

- HM Government, 1996a; The Pipelines Safety Regulations 1996 (SI 1996/825) [online]. Available at: https://www.legislation.gov.uk/uksi/1996/825/contents/made (Accessed 25/08/2025)
- HM Government, 1996b; Gas Safety (Management) Regulations 1996 (SI 1996/551) [online]. Available at: https://www.legislation.gov.uk/uksi/1996/551/contents/made (Accessed 25/08/2025)
- HM Government, 1998a; The Lifting Operations and Lifting Equipment Regulations 1998 (SI) 1998/2307) [online]. Available at: https://www.legislation.gov.uk/uksi/1998/2307/contents (Accessed 25/08/2025)
- HM Government, 1998b; The Provision and Use of Work Equipment Regulations (SI 1998 No. 2306) [online]. Available at: https://www.legislation.gov.uk/uksi/1998/2306/contents (Accessed 25/08/2025)
- HM Government, 1999; Management of Health and Safety at Work Regulations 1999 (SI 1999/3242) [online]. Available at: https://www.legislation.gov.uk/uksi/1999/3242/contents/made (Accessed 25/08/2025)
- HM Government, 2002a; Dangerous Substances and Explosive Atmospheres Regulations 2002 (SI 2002/2776) [online]. Available at: https://www.legislation.gov.uk/uksi/2002/2776/contents (Accessed 25/08/2025)
- HM Government, 2002b; The Control of Substances Hazardous to Health (COSHH) Regulations 2002 (SI 2002/2677) [online]. Available at: https://www.legislation.gov.uk/uksi/2002/2677/contents/made (Accessed 25/08/2025)
- HM Government, 2004; Civil Contingencies Act 2004 (SI 2004/36) [online]. Available at: https://www.legislation.gov.uk/ukpga/2004/36/contents (Accessed 26/08/2025)
- HM Government, 2005; The Regulatory Reform (Fire Safety) Order 2005 (SI 2005/1541) [online]. Available at: https://www.legislation.gov.uk/uksi/2005/1541/contents (Accessed 26/08/2025)
- HM Government, 2008a; The Supply of Machinery (Safety) Regulations 2008 (SI 2008/1597) [online]. Available at:

https://www.legislation.gov.uk/uksi/2008/1597/contents/made (Accessed 26/08/2025)

- HM Government, 2008b; *Regulation (EC) No 1272.2008 of the European Parliament and of the Council (SI 1272/2008)* [online]. Available at: https://www.legislation.gov.uk/eur/2008/1272/contents (Accessed 26/08/2025)
- HM Government, 2010; The Building Regulations 2010 (SI 2010/2214) [online]. Available at: https://www.legislation.gov.uk/uksi/2010/2214/contents (Accessed 26/08/2025)
- HM Government, 2011; Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification) [online]. Available at: https://www.legislation.gov.uk/eudr/2011/92 (Accessed 26/08/2025).
- HM Government, 2014; Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment [online]. Available at: https://www.legislation.gov.uk/eudr/2014/52/introduction (Accessed 26/08/2025).
- HM Government, 2015a; Construction (Design and Management) Regulations 2015 (SI 2015/51) [online]. Available at: https://www.legislation.gov.uk/uksi/2015/51/contents/made (Accessed 26/08/2025)
- HM Government, 2015b; The Planning (Hazardous Substances) Regulations 2015 (SI 2015/627) [online]. Available at: https://www.legislation.gov.uk/uksi/2015/627/contents/made (Accessed 26/08/2025)
- HM Government, 2015c; The Control of Major Accident Hazard (COMAH) Regulations 2015 (SI 2015/483) [online]. Available at: https://www.legislation.gov.uk/uksi/2015/483/contents/made (Accessed 26/08/2025)
- HM Government, 2015d; *The Classification, Labelling and Packaging Regulations 2015 (SI 2015/21)* [online]. Available at: https://www.legislation.gov.uk/uksi/2015/21/made (Accessed 26/08/2025)
- HM Government, 2016a; The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations

2016 (SI 2016/1107) [online]. Available at: https://www.legislation.gov.uk/uksi/2016/1107/contents/made (Accessed 26/08/2025)

- HM Government, 2016b; The Environmental Permitting (England and Wales) Regulations 2016 (SI 2016/1154) [online]. Available at: https://www.legislation.gov.uk/uksi/2016/1154/contents/made (Accessed 26/08/2025)
- HM Government, 2016c; The Pressure Equipment (Safety) Regulations 2016 (SI 2016/1105) [online]. Available at: https://www.legislation.gov.uk/uksi/2016/1105/contents (Accessed 26/08/2025)
- HM Government, 2017; The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (SI 2017/572). London: HM Government (Accessed 26/08/24)
- HM Government, 2023a; Gas Safety (Management) (Amendments) Regulations 2023 (SI 2023/284) [online]. Available at: https://www.legislation.gov.uk/uksi/2023/284/contents (Accessed 28/08/2024)
- HM Government, 2023b; Gas Safety (Management) (Amendments) (No. 2) Regulations 2023 (SI 2023/320) [online]. Available at: https://www.legislation.gov.uk/uksi/2023/320/contents/madehttps://www.legislation.gov.uk/uksi/1996/551/contents/made (Accessed 28/08/2025)
- HM Government, 2025a. National Risk Register [online]. Available at: https://assets.publishing.service.gov.uk/media/67b5f85732b2aab18314bbe4/National_Risk_Register_2025.pdf (Accessed 26/08/24)
- HM Government, 2025b. Nationally Significant Infrastructure Projects - Advice Note Nine: Rochdale Envelope [online]. Available at: https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-nine-rochdale-envelope/nationally-significant-infrastructure-projects-advice-note-nine-rochdale-envelope (Accessed 26/08/24)
- HSE, n.d.; Major Hazard Regulatory Model: Safety Management in Major Hazard Sectors [online]. Available at: https://www.hse.gov.uk/regulating-major-hazards/assets/docs/major-hazards-regulatory-model.pdf (Accessed 26/08/24)
- HSE, 1996; Further guidance on emergency plans for major accident hazard pipelines [online]. Available at: https://www.hse.gov.uk/pipelines/assets/docs/emergencyplanpipe.pdf (Accessed 26/08/24)

- HSE. 2001; Reducing Risk, Protecting People: HSE's Decision Making Process [online]. Available at: https://www.hse.gov.uk/enforce/assets/docs/r2p2.pdf (Accessed 26/08/24)
- HSE, 2015a; COMAH 2015 Public Information Search [online]. Available at: https://notifications.hse.gov.uk/COMAH2015/search.aspx (Accessed 26/08/24)
- HSE, 2015b; Emergency Planning for Major Accidents (HSG 191): COMAH Regulations 2015. Sudbury: HSE Books
- HSE, 2024; Advice on working with public bodies in the infrastructure planning process, Annex G: The Health and Safety Executive (HSE, 2024) [online]. Available at: https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-eleven-working-with-public-bodies-in-the-infrastructure-planning-process/nationally-significant-infrastructure-projects-advice-note-eleven-annex-g-the-health-and-safety-executive (Accessed 26/08/24)
- IEMA, 2020; Major Accidents and Disasters: An IEMA Primer [online]. Available at: https://www.iema.net/resources/reading-room/2020/09/28/major-accidents-and-disasters-in-eia-an-iema-primer (Accessed 26/08/24)
- MHCLG, 2021; *National Planning Policy Framework* [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf (Accessed 26/08/24)
- NLC, 2007; North Lincolnshire Local Plan 2007. [Online] Available at: https://m.northlincs.gov.uk/planningreports/northlincolnshirelocalplan/developmentstandards2.pdf (Accessed 11/08/2025)
- NLC, 2022; North Lincolnshire Local Plan 2022. [Online] Available at: https://m.northlincs.gov.uk/public/localplan/examination/North%20Lincolnshire%20Local%20Plan%20-%20Submission%202022.pdf (Accessed 26/08/24)
- The International Federation of Red Cross & Red Crescent Societies, 2022. Early Warning, Early Action [online]. Available at: https://www.ifrc.org/our-work/disasters-climate-and-crises/climate-smart-disaster-risk-reduction/early-warning-early#:~:text=Early%20warning%20and%20early%20action,on%20early%20warning%20or%20forecasts. (Accessed 26/08/24)

- The Planning Practice Guidance (PPG) for Hazardous Substances (DLUHC, 2019) [online]. Available at: https://www.gov.uk/guidance/hazardous-substances (Accessed 26/08/24)