

Lighthouse Green Fuels

Development Consent Order

Preliminary Environmental Information Report

Chapter 19: Major Accidents and Disasters

Planning Inspectorate Reference: EN0110025

2nd December 2025

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1. Introduction

1.1 Overview

1.1.1 This Chapter of the Preliminary Environmental Information Report (PEIR) provides an assessment of whether the risks of specific 'Major Accidents and Disasters' (MA&D) arising from the Proposed Development have the potential to result in likely significant effects. The assessment considers two scenarios:

- Construction phase, including construction of the quay, Sustainable Aviation Fuel (SAF) Plant and Combined Heat and Power (CHP) Plant, and the connections within the identified connection corridors; and
- Operation phase of the Proposed Development.

1.1.2 The hazards from decommissioning are anticipated to be encompassed by those assessed for the construction and operation phase, and therefore no additional decommissioning hazards have been identified or considered.

1.1.3 The terms Major Accident and Disasters are defined in Table 1-1 and relate to extreme events that would not reasonably be predicted or assessed within the other topic chapters of an Environmental Impact Assessment (EIA). These definitions have been developed with reference to those used in EU and UK legislation and guidance relevant to MA&D as well as professional judgement in the context of the Proposed Development. These definitions have been developed with reference to those used in EU and UK legislation and guidance relevant to MA&D as well as professional judgement in the context of the Proposed Development.

Table 1-1 Key Definitions Relevant to this Assessment Topic

Term	Definition
ALARP	"ALARP" stands for "as low as reasonably practicable". Reasonably practicable involves weighing a risk against the trouble, time and money needed to control it. Thus, ALARP describes the level to which the Health & Safety Executive (HSE) expects to see workplace risks controlled.
Disaster	In the context of this PEIR, a naturally occurring phenomenon such as an extreme weather event, like a storm, flood, or high temperature, or ground-related hazard events, such as subsidence, landslide or earthquake, with the potential to cause an event or situation that meets the definition of a Major Accident.
Environmental Receptor	The specific component of the environment that could be adversely affected if the source reaches it in a 'source-pathway-receptor' model. Environmental receptor is specifically defined as: features of the environment that are subject to assessment, namely population and human

Term	Definition
	health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage and landscape.
Hazard	Anything with the potential to cause harm, including ill-health or injury, damage to property or the environment; or a combination of these.
Major Accident	In the context of the Proposed Development, an event that threatens immediate or delayed serious damage to human health, welfare and/or the environment and requires the use of resources beyond those of the Applicant or their contractor(s) to respond. Serious damage includes the loss of life or permanent injury, and/or permanent or long-lasting damage to a receptor that cannot be restored through minor clean-up and restoration efforts. The significance of this effect will take into account the extent, severity and duration of harm and the sensitivity of the receptor.
Risk	The likelihood of an impact occurring, combined with effect or consequence(s) of the impact on a receptor if it does occur.
Risk Event	An identified, unplanned event, which is considered relevant to the Proposed Development and has the potential to be a MA&D, subject to assessment of its potential to result in a significant adverse effect on a receptor.
Sensitivity	The sensitivity of a receptor is a function of its value and capacity to accommodate change, reflecting its ability to recover if it is affected. It is typically defined by the following factors: • Adaptability – the degree to which a receptor can avoid, adapt to or recover from an effect. • Tolerance – the ability of a receptor to accommodate temporary or permanent change. Recoverability – the temporal scale over and extent to which a receptor will recover following an effect.

1.1.4 Following initial assessment in the EIA Scoping Report (Appendix 1A, PEIR Volume 3) presents the risks that were agreed to be scoped into this assessment for the construction and operation stages of the Proposed Development.

Table 1-2 Scoped in Risks Assessed in this Chapter

Risk	Construction & Decommissioning	Operation
Hydrological, Coastal and fluvial flooding	Yes	No
Hydrological, Pluvial flooding	Yes	Yes
Climatological and meteorological, Wave surges	Yes	Yes
Industrial and Urban Accidents, Major Accident Hazards Chemical Sites	Yes	Yes
Industrial and Urban Accidents, Major Accident Hazards Pipelines	Yes	Yes
Industrial and Urban Accidents, Fuel Storage	Yes	Yes
Transport Accidents, Rail	No	Yes
Transport Accidents, Waterways	Yes	Yes
Pollution Incidents, Land	No	Yes
Pollution Incidents, Water	No	Yes
Malicious Attacks, Unexploded Ordnance (UXO)	Yes	No

1.1.5 These were scoped in, as further mitigation beyond the embedded mitigations was deemed to be required. All other risks were not deemed to require further mitigation and were scoped out.

1.1.6 This was confirmed by the EIA Scoping Opinion (Appendix 1B, PEIR Volume 3), which was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 11 November 2025. The responses in relation to MA&D and how the requirements should be addressed by the Applicant are set out in Table 1-3.

Table 1-3 Scoping Opinion comments and responses

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments
3.15.1 Paragraphs 19.8.1 to 19.8.3	Low consequence events (regardless of likelihood) High likelihood and high consequence events	Low consequences events are proposed to be scoped out as these are unlikely to result in significant adverse effects because they do not fall into the definition of a major accidents and/or disasters risk. High likelihood and high consequence events are also proposed to be scoped out as it is assumed that existing legislation

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments
		and regulatory controls would not permit the proposed development to be progressed under these circumstances. In line with the IEMA guidance (IEMA: Major Accidents and Disasters in EIA: A Primer 2020 (Ref 1), the Inspectorate agrees including such events would not be proportionate to the assessment. The relevant legislation / regulatory controls should however be confirmed and referenced.
3.15.2 Paragraph 19.8.5	Occupational health and safety	The applicant proposes to scope out occupational health and safety. The Inspectorate agrees EIA of major accidents is not intended to replace or duplicate health and safety regulations that are in place to manage risks, and this matter can therefore be scoped out of the ES.
3.15.1 Paragraphs 19.8.1 to 19.8.3	Low consequence events (regardless of likelihood) High likelihood and high consequence events	Low consequences events are proposed to be scoped out as these are unlikely to result in significant adverse effects because they do not fall into the definition of a major accidents and/or disasters risk. High likelihood and high consequence events are also proposed to be scoped out as it is assumed that existing legislation and regulatory controls would not permit the proposed development to be progressed under these circumstances.

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments
		In line with the IEMA guidance (IEMA: Major Accidents and Disasters in EIA: A Primer 2020 (Ref 1), the Inspectorate agrees including such events would not be proportionate to the assessment. The relevant legislation / regulatory controls should however be confirmed and referenced.

2. Legislation, Planning Policy and Guidance

2.1 Overview

- 2.1.1 This Section outlines the legislation, planning policy and guidance context for the Proposed Development with reference to MA&D.

Legislative Background

Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) (Ref 2)

- 2.1.2 The Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017 cover the process of EIA in the context of Nationally Significant Infrastructure Projects (NSIPs). They apply the amended EU Directive 2014/52/EU.

- 2.1.3 Schedule 4 Paragraph 5(d) of the EIA Regulations requires:

“A description of the likely significant effects of the Proposed Development on the environment resulting from the risks to human health, cultural heritage or the environment (for example due to accidents or disasters).”

- 2.1.4 Schedule 4, Paragraph 8 of the EIA Regulations requires:

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

If appropriate, a description of the measures envisaged to prevent or mitigate the significant adverse effects of major accidents and / or disasters on the environment and details of the preparedness for and proposed response to such emergencies.”

Health and Safety at Work etc. Act 1974 (the HSW Act) (Ref 3)

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

Construction (Design and Management) Regulations 2015 (the CDM Regulations) (Ref 4)

- 2.1.6 The CDM Regulations place legal duties on almost all parties involved in

construction work, with specific duties on clients, designers and contractors, so that health and safety is considered throughout the life of a construction project from inception to demolition and removal.

2.1.7 The client, designer(s) and contractor(s) must avoid foreseeable risks, so far as is reasonably practicable, by eliminating hazards associated with the design, construction, operation and maintenance of the Proposed Development.

2.1.8 The Regulations ensure that mechanisms are in place to continually identify, evaluate and manage safety risks throughout the design, construction and operation phases of the Proposed Development. Many of the risks identified and managed at the detailed design phase also serve to eliminate or reduce the risk of a major accident, and therefore environmental consequence, occurring during the construction and operation phases.

COMAH Regulations 2015 (Ref 21)

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

The Planning (Hazardous Substances) Regulations 2015 (Ref 6)

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

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

2.1.12 Many of the risks identified and managed at the detailed design phase also serve to eliminate or reduce the risk of a major accident, and therefore environmental consequence, occurring during the construction, operation and decommissioning phases.

The Supply of Machinery (Safety) Regulations 2008 (Ref 7)

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

2.1.14 Many of the risks identified and managed in the design of machinery used in and associated with the Proposed Development will serve to eliminate or reduce the risk of a major accident, and therefore environmental

consequence, occurring during the construction and operation phases of the Proposed Development.

The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) (Ref 8)

- 2.1.15 DSEAR implements the Chemical Agents Directive 98/24/EC and the Explosive Atmospheres Directive 99/92/EC. DSEAR sets minimum requirements for the protection of staff from fire and explosion risks arising from dangerous substances and potentially explosive atmospheres.
- 2.1.16 Under the regulations, the Proposed Development will require that mechanisms are in place to identify, evaluate and manage the risk of a major accident due to loss of containment to ALARP.
- 2.1.17 Many of the risks identified and managed will serve to eliminate or reduce the risk of a major accident, and therefore environmental consequence, occurring during the construction and operation phases of the Proposed Development.

The Equipment and Protective Systems for Use in Potentially Explosive Atmospheres Regulations 1996 and 2016 (Ref 9)

- 2.1.18 The Regulations implement measures for safety and consumer protection with respect to electrical equipment and any provisions concerning the composition, labelling, marketing, classification or description of electrical equipment intended to be used in potentially explosive atmospheres.
- 2.1.19 The use of the correct level of intrinsically safe equipment and protective systems will likely minimise the likelihood of a large-scale release of SAF or naphtha from the Proposed Development and therefore reduce the risk of a Major Accident.

Occupier's Liability Act 1984 (c.3) (Ref 10)

- 2.1.20 This Act amends the law of England and Wales as to the liability of persons as occupiers of premises for injury suffered by persons other than their visitors.
- 2.1.21 The Act provides a legal framework for the prevention of harm to people from occupational safety and health hazards present on premises under the control of the occupier, including to those visiting the premises.
- 2.1.22 The Proposed Development will include premises controlled by the Applicant that will attract visitors who could be impacted by MA&D whilst on/crossing those controlled premises.

The Pipelines Safety Regulations 1996 (Ref 11)

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

National Planning Policy Context

The Overarching National Policy Statement (NPS) for Energy (EN-1)

- 2.1.24 This NPS provides the primary basis for decision by the Secretary of State on applications it receives for energy infrastructure . There are no relevant policies in NPS EN-3 for Renewable Energy Infrastructure.
- 2.1.25 The NPS EN-1 does not contain any specific requirements in relation to a standard EIA MA&D assessment. Section 4.13 of EN-1 addresses policy in respect of safety, which broadly covers health and safety and Major Accident matters. The policies within this section note the role of the HSE as regulator for enforcement of health and safety legislation including COMAH and the role of local authorities in relation to hazardous substances consent. Section 4.14 of EN-1 separately addresses management of hazardous substances and the mitigation of major accidents which involve them.
- 2.1.26 Section 4.16 of EN-1 provides advice in relation to security considerations, outlining the role of the Department for Energy Security and Net Zero (DESNZ) and other agencies in relation to terrorism and other national security threats and the role of government policy to ensure the design and protection of the most critical infrastructure assets.

National Planning Policy Framework (NPPF), 2024 (Ref 13)

- 2.1.27 The NPPF may have importance or relevance to the determination of the DCO application. It highlights that the purpose of the planning system is to contribute to the achievement of sustainable development through three overarching objectives: economic, social and environmental.
- 2.1.28 The NPPF states that:
- “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.”*
- 2.1.29 It goes on to state that:
- “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).”*

2.1.30 It also states that:

“Planning policies and decisions should ensure that: a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining.”

Local Planning Policy Context

Stockton-on-Tees Borough Council – Local Plan (2019) (Ref 14)

2.1.31 Policy SD 5 – Natural, Built and Historic Environment is applicable to the Proposed Development regarding considering risk acceptability:

“Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of ground, air, water, light or noise pollution or land instability. Wherever possible proposals should seek to improve ground, air and water quality.”

Redcar and Cleveland Borough Council - Local Plan (2018) (Ref 15)

2.1.32 Policy SD 4 - General Development Principles states that:

“In assessing the suitability of a site or location, development will be permitted where it...

e. avoids locations that would put the environment, or human health or safety, at unacceptable risk.”

Other Guidance

2.1.33 At present, there is no recognised standard methodology for the assessment of MA&D within EIA however, the following pieces of guidance have been used within the assessment.

IEMA: Major Accidents and Disasters in EIA: A Primer 2020 (Ref 1)

2.1.34 In September 2020, the Institute of Environmental Management and Assessment (IEMA), in partnership with Arup, published, ‘Major Accidents and Disasters in EIA: A Primer’ (‘the IEMA Primer’), which is a risk assessment using a source-pathway-receptor based approach.

2.1.35 The purpose of the IEMA Primer is to increase awareness of the MA&D topic and its application within all stages of EIA. It outlines an assessment methodology based on known current practice within the UK and provides definitions of key terminology.

2.1.36 The IEMA Primer is structured around a typical assessment approach and

provides a proportionate method for considering major accidents and disasters through the stages of EIA.

- 2.1.37 The assessment of MA&D in relation to the Proposed Development has been based on a combination of the IEMA Primer and professional judgement.

‘Green Leaves III’ Guidelines for Environmental Risk Assessment and Management 2011 (Green Leaves III) (Ref 16)

- 2.1.38 Green Leaves III provides generic guidance for the assessment and management of environmental risks. A cyclical framework for risk management is presented that identifies four main components of risk assessment:

- formulating the problem;
- carrying out an assessment of the risk;
- identifying and appraising the management options available; and
- addressing the risk with a risk management strategy.

- 2.1.39 A source-pathway-receptor model is suggested as a tool to assist in risk screening, and an example is provided of applying the following filters to prioritise significant hazards for further investigation:

- the plausibility of linkages between the source of a hazard and a receptor;
- the relative potency of a hazard, availability of a pathway, or vulnerability of a receptor;
- the likelihood of an event, based on historic occurrence or of changed circumstances; and
- a view on the performance of current risk management measures that, if they were to fail, may increase the potential for future harm.

Guideline – Environmental Risk Tolerability for COMAH Establishments 2013 (Ref 17)

- 2.1.40 Provides generic guidance on how to undertake environmental risk assessments required by the COMAH Regulations. It provides a definition of the types of harm that should be considered in an environmental risk assessment, and how the harm should be characterised for the assessment. In this context, the level of environmental harm that would be considered serious has been defined for different receptor types in terms of the combination of the:

- extent (the area / distance);
- severity (the degree of harm within the area of impact); and
- duration (the recovery period).

2.1.41 For environmental harm to be considered serious then all parameters must exceed the receptor thresholds as defined in this guideline. The thresholds reflect expert opinion on levels of harm that would be considered serious, with consideration to various receptor specific areas of legislation, such as the Water Framework, Habitats and Environmental Liability Directives.

2.1.42 The guideline also provides:

- a definition of the risk criteria to be used in assessing the tolerability of the environmental risk from an establishment and, where appropriate, individual scenarios; and
- guidance on how the risks may be evaluated.

ISO 31000:2018 Risk Management – Guidelines 2018 (Ref 18)

2.1.43 This guidance identifies principles that need to be satisfied to make risk management effective. If the standards are adopted and applied, the management of any risk should help minimise losses, improve resilience, improve controls and improve the identification of opportunities and threats.

2.1.44 The guidance includes that when defining risk criteria, the following factors should be considered:

- the nature and types of causes and consequences that can occur and how they will be measured;
- how likelihood will be defined
- the timeframe(s) of the likelihood or consequence(s);
- how the level of risk is to be determined;
- the views of stakeholders;
- the level at which risk becomes acceptable or tolerable; and
- whether combinations of multiple risks should be considered and, if so how, and which combinations should be considered.

HSE Guidance

2.1.45 There is 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 energy infrastructure, the storage and use of chemicals, and major accident hazard pipelines conveying high pressure gases. Comparable large scale energy vector production facilities have been in operation for many years and employ similar established technology to produce liquid fuels. The HSE publishes 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 1999 (COMAH) (Ref 19);

- Further guidance on emergency plans for major accident hazard pipelines (HSE, 1997) (Ref 20); and
- The Control of Substances Hazardous to Health Regulations (Ref 21).

2.1.46 HSE guidance that is of relevance to the assessment of MA&D includes:

- Chemicals and Downstream Oil Industries Forum Guidelines, Environmental Risk Tolerability for COMAH Establishments (Ref 17);
- Chapter 4 Local responder risk assessment duty, Cabinet Office's Emergency Preparedness, Guidance on part 1 of the Civil Contingencies Act 2004 ('CCA risk assessment framework') (Ref 22); and
- Reducing Risks, Protecting People: HSE's decision making process, (Ref 23).

3. Assessment Methodology and Significance Criteria

3.1 Impact Assessment and Significance Criteria

3.1.1 The IEMA Primer suggests that the MA&D topic can be scoped out of an EIA if it can be demonstrated that:

- There is no source-pathway-receptor linkage of a hazard that could trigger a Major Accident or Disaster or potential for the Proposed Development to lead to a significant environmental effect; or
- The risk events have a low likelihood/low consequence, as they do not meet the criteria under risk assessment as likely significant environmental effects and therefore do not meet the definition of MA&D; or
- The risk events have a high likelihood/high consequence, as these would be considered unacceptable, and the Proposed Development would not progress further; or
- The MA&D are adequately covered elsewhere in the EIA or covered by existing design measures or compliance with legislation and best practice.

3.1.2 However, if the above cannot be demonstrated then the MA&D topic must be scoped in, as it has been in this PEIR.

3.1.3 To assess the likely significant effects from MA&D, a risk identification exercise has been undertaken. It considers the baseline for each risk and whether, through embedded and existing mitigation, the risk can be said to be ALARP and therefore scoped out of further assessment. If this is not possible then the risk is scoped in.

3.1.4 This assessment has been applied to the Rochdale Envelope of the Proposed Development design at this stage, and consider credible, worst case MA&Ds associated with the Proposed Development. This conservative methodology establishes the risk of MA&Ds which would be reduced to a level as low as reasonably practicable by the design and operation of the facilities. At this stage in the project, safety, monitoring and control systems and procedures have not yet been developed. However, standard industry approaches to managing risk are assumed will be used. In addition, equipment such as fire, flammable and toxic gas, and leak detection systems and emergency shutdown systems will be installed as required.

3.1.5 The MA&Ds assessment considers threats or hazards against the following categories in order to assign a tolerability and a risk classification to each hazard:

- Severity;
- Probability;
- duration; and
- consequence.

3.1.6 Tolerable and tolerable-if-ALARP risks are considered as 'not significant' and intolerable risks are considered as 'significant' for the purposes of the assessment.

3.1.7 A two stage assessment has been undertaken to date:

Stage 1: Screening Exercise

3.1.8 A Stage 1 Screening Exercise was undertaken during EIA Scoping. This approach identified the likelihood of an event, and the potential consequences should the event occur and followed the source-pathway-receptor model. It then considered whether existing design measures or legal standards could adequately control the potential for a Major Accident or Disaster or could the risk be covered by another topic within the ES.

3.1.9 In examining the potential consequences of such risks, the following was considered:

- the geographic extent of the effects of the risks. Effects beyond the boundary of the Proposed Development are more likely to be considered significant;
- the duration of the effects from the risks. Effects which are permanent (i.e. irreversible) or long lasting are more likely to be considered significant;
- the severity of the effects in terms of number, degree of harm to those impacted and the response effort required. Effects which trigger the mobilisation of substantial civil emergency response effort are more likely to be considered significant;
- the sensitivity of the identified receptors; and
- the effort required to restore the environment. Effects requiring substantial clean-up or restoration efforts are more likely to be considered significant.

3.1.10 Where there was no credible pathway to the receptor or where the risk was of low likelihood and low consequence and therefore not significant, the risk was scoped out of the impact assessment. The risks that could not be mitigated through existing design measures and legal standards were scoped into the assessment.

3.1.11 High likelihood, high consequence risks were also scoped out, as these are unacceptable for any project and were managed or designed out of the Proposed Development, as per the IEMA Primer guidance.

3.1.12 The significance threshold of a hazard has been defined as anything that

causes the loss of life or permanent injury, and/or permanent or long-lasting damage to an environmental, social or economic receptor.

3.1.13 Receptors have been identified based on their proximity and sensitivity to the Proposed Development, as well as the presence of a pathway between the hazard source and the receptor. The following Chapters (PEIR Volume I) were also used to identify potential receptors relevant to the MA&D assessment:

- Chapter 8: Air Quality;
- Chapter 9: Noise and Vibration;
- Chapter 10: Terrestrial Ecology;
- Chapter 11: Freshwater and Marine Ecology;
- Chapter 12: Water Environment and Flood Risk;
- Chapter 15: Climate Change Resilience;
- Chapter 17: Socioeconomics (includes human health);
- Chapter 18: Traffic and Transport; and
- Chapter 20: Marine Navigation.

Stage 2: Risk Assessment

3.1.14 During the Stage 2 Risk Assessment, mitigation measures embedded in the Proposed Development and expected operational plans and procedures to be adopted for the Proposed Development, were taken into consideration and the likely environmental impacts on receptors identified. The likelihood of environmental effects occurring for each risk event was then considered.

3.1.15 If a risk remained after the design embedded mitigation was considered, even if classed as low risk, it was classified as a residual consequence. The risk was then further assessed to determine if it could be described as ALARP or if additional mitigation was required to reduce it to ALARP.

Study Area

3.1.16 The study area for individual identified hazards and threats has been considered based on the likely impact pathways, distances to receptors, the scale of potential worst-case impact from case-study incidents, and on professional judgement if no information on previous events is available.

3.1.17 The study area for this assessment has been determined based on a likely worst-case impact area, in the event of a Major Accident or Disaster. It has been informed by the maximum realistic extent of other topic assessment study areas and includes the extent of the Site.

3.1.18 The following factors and associated distances from the Site were adopted

for setting the study area. These captured the internal and external influencing factors that may have high adverse consequences on the Proposed Development:

- Manmade features:
 - Airports and airfields within 15km;
 - COMAH facilities within 5km;
 - Major accident hazard pipelines within 1km;
 - Nuclear installations within 3km (distance to The Land Use Planning Outer Consultation Zone);
 - Fuel retail sites, including Liquified Natural Gas, Liquified Petroleum Gas, within 1km;
 - Rail infrastructure within 0.5km; and
 - Transmission of gas, electricity, oil/fuels, crossing the Site.
- Natural features with the potential to create risks within:
 - 3km, chiefly hydrological and geological, for example dam failure and seismic activity; and
 - 1km, chiefly hydrological and geological, for example flood risk and unstable ground conditions.

3.1.19 The study areas have been based primarily on information held by the Applicant and information gathered to inform this Chapter from the data sources discussed below.

Sources of Information and Data

3.1.20 Baseline data collection has been undertaken to obtain information within the study areas.

3.1.21 The data sources in Table 3-1 were accessed to inform the baseline with respect to MA&D, and the assessment also draws on baseline data collated for other topics in the EIA.

Table 3-1 Data Sources used to Inform the MA&D Assessment

Source of data	Baseline data	Ref
National Risk Register of Civil Emergencies	National risk register information	(Ref 24)
British Geological Survey (BGS) GeoIndex Onshore	Borehole and geological information	(Ref 25)
Tsunamis Hazard Map	Tsunami information relating to climate changes	(Ref 26)
The International Disaster Database	Mass disasters and disaster preparedness	(Ref 27)
HSE's Planning Advice Web App	Planning guidance support	(Ref 28)
HSE's COMAH 2015 Public Information Search	COMAH sites	(Ref 29)
Google aerial and street view maps	Road, rail, waterway, property information	(Ref 30)
Technical topic Chapters (Chapter 5: Air Quality to Chapter 20: Marine Navigation).	--	

Limitations and Assumptions

- 3.1.22 This assessment is based on the 'design for planning' of the Proposed Development and early appraisal of potential hazards. The safety in design including vulnerability of the Proposed Development to MA&D will continue to evolve as an intrinsic part of the design phase.
- 3.1.23 An Engineering, Procurement and Construction (EPC) Contractor(s) and therefore Principal Contractor under the CDM Regulations, has not yet been appointed, and a detailed Construction Environmental Management Plan has not been developed. It has been assumed that standard industry practices to manage risk to ALARP will be used and therefore risks will be continuously refined and reappraised as the project design develops.
- 3.1.24 Further work to be completed and included in the ES comprises:
- The MA&D assessment will be further developed and refined based on any relevant responses to the Statutory Consultation;
 - Engage with the HSE to understand which COMAH based consultation zones overlap the Proposed Development to enable the Study Area to be further refined for the ES;
 - The assessment within the ES will involve a review of the potential MA&D scenarios based on further information as part of ongoing design development;

- Assessment of the MA&D types which could not be addressed in this PEIR due to insufficient information being available at this stage of the Proposed Development; and
- Confirm the securing mechanisms for embedded measures required by other consents, licences and permits such as the COMAH Licence application and Environmental Permits.

4. Baseline Conditions

4.1 Introduction

- 4.1.1 This section provides a description of the environmental baseline characteristics within the Study Area.

4.2 Existing baseline

- 4.2.1 The baseline relevant to MA&D comprises:
- Features external to the Proposed Development that contribute a potential source of hazard to the Proposed Development, such as flooding from the River Tees, extreme weather events such as storms, or heatwaves;
 - Sensitive environmental receptors at risk of significant effect; and
 - Current (without the Proposed Development) MA&D risks for the existing locality, such as from COMAH facilities or Major Accident Pipelines in the vicinity of the Main Site or in the Sembcorp pipeline corridor that crosses the Main Site.
- 4.2.2 The Main Site is located within current Control of Major Accident Hazards (COMAH) consultation boundaries for several sites in the surrounding area as follows:
- CF Fertilisers UK Ltd;
 - Navigator Terminals Seal Sands Ltd;
 - SABIC UK Petrochemicals Ltd;
 - Exolum Seal Sands Ltd;
 - ConocoPhillips (UK) Teeside Operator Ltd; and
 - Fine Organics Ltd.
- 4.2.3 In addition, there is one current COMAH site within 250m of the Main Site operated by px (TGPP) Ltd located 45m to the west and one historical COMAH site recorded within Main Site.
- 4.2.4 In future the Main Site will be within the COMAH site boundaries for NEP's CO₂ Gathering Network pipeline and, potentially, the proposed H₂Teeside hydrogen pipeline.
- 4.2.5 Baseline data from the following Chapters (PEIR Volume I) has informed the MA&D assessment:
- **Chapter 8:** Air Quality;
 - **Chapter 9:** Noise and Vibration
 - **Chapter 10:** Terrestrial Ecology;
 - **Chapter 11:** Freshwater and Marine Ecology;

- **Chapter 12:** Water Environment and Flood Risk;
- **Chapter 15:** Climate Change Resilience;
- **Chapter 17:** Socioeconomics (includes human health);
- **Chapter 18:** Traffic and Transport; and
- **Chapter 20:** Marine Navigation.

4.3 Future Baseline

- 4.3.1 The future baseline is not anticipated to differ significantly from the existing baseline with regards to the vulnerability of the Proposed Development to the risk of major accident(s) and/or disaster(s), other than the approved NZT development and proposed H2Teesside development.

5. Development Design and Impact Avoidance

5.1 Overview

- 5.1.1 Through compliance with health and safety legislation during construction and operation, risks to employees will be mitigated to ALARP. The following measures will be embedded in the design and processes of the Proposed Development.

5.2 Design phase

- 5.2.1 The design engineers have considered different scenarios for process safety and safeguarding, vessel or pipeline isolation measures, emergency shutdown procedures and if required, depressurisation. They will also considered hazards and off-site risks when developing the concept layout of the Proposed Development including considering the on-site location of facilities.
- 5.2.2 A design hazard management plan will be prepared and hazard identification (HAZID) and hazard and operability (HAZOP) evaluation assessments have been and will continue to be carried out on the Proposed Development during the design process. This is a standard approach to preventing or otherwise minimising hazardous scenarios through appropriate design during the Front-End Engineering Design (FEED) process.
- 5.2.3 Major Accident assessments and studies will be prepared as part of the detailed design of the facility post Final Investment Decision and a Major Accident Prevention Plan (MAPP) will be prepared to inform the future application for COMAH Licence for the operational facility.

5.3 Construction

- 5.3.1 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 construction of the Proposed Development. CDM regulations will be followed during construction and commissioning. A Marine Licence will be required for construction of the quay.
- 5.3.2 A Construction Environmental Management Plan (CEMP) will be prepared to set out how construction activities would be managed and controlled to maintain compliance with relevant legislation and environmental permits,

consents and licences. An Outline CEMP (oCEMP) will be included in the Development Consent Order (DCO) application.

5.4 Operation

- 5.4.1 A COMAH Licence from the HSE and an Environmental Permit from the Environment Agency will be required for the operation of the Proposed Development. Both permissions will require measures to be implemented and monitored to the satisfaction of the regulators. These will include the use of appropriate control techniques and monitoring systems and procedures, management systems and control measures to minimise the risk of accidents occurring and minimising the effects of any such accidents on off-site receptors and the operational workforce. The environmental permit will require the adoption of Best Available Techniques (BAT) for control of emissions and accidents. A Marine Licence will be required for operation of the quay.

5.5 Decommissioning

- 5.5.1 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 decommissioning of the Proposed Development. CDM regulations will be followed.
- 5.5.2 A Decommissioning Environmental Management Plan (DEMP) will be prepared to set out how demolition and decommissioning activities would be managed and controlled to maintain compliance with relevant legislation and environmental permits, consents and licences. A Decommissioning Plan will also be required to be agreed with the Environment Agency prior to any decommissioning works being undertaken.

6. Likely Impacts and Effects of the Proposed Development

6.1 Overview

6.1.1 This section details the output of the preliminary assessment of the vulnerability of the Proposed Development to the risk of MA&D during both the construction/ decommissioning and operation phases, taking into account the embedded design, mitigation and enhancement measures.

6.2 Construction and decommissioning

6.2.1 A number of potential accident scenarios could occur during construction of the Proposed Development including:

- Fire or explosion including through disturbance of MAH pipelines which are within the site (Sembcorp pipeline corridor) or nearby; and
- Leaks and spillages of chemicals or fuels resulting in contamination or release of hazardous substances to the environment.

6.2.2 A summary of the construction phase assessment is provided within Table 6-1.

6.3 Operation

6.3.1 There will be hazardous and potentially harmful substances present in the SAF Plant, CHP Plant, Natural Gas Connection and SAF export pipelines in quantities which, if released, have the potential to cause MA&D. A summary of the operation phase assessment is provided within Table 6-2.

Table 6-1 Potential MA&D Events (Construction and Decommissioning)

MA&D Category	Risk Description	Risk Event and Consequence	Embedded mitigation	ALARP?
Technological or Manmade Hazards: Industrial and Urban Accidents.	Striking of third-party existing MAH pipelines leading to a significant loss of containment event.	Fire and/or explosion or release of harmful gas. Uncontrolled firewater run-off reaching controlled water and the internationally designated Teesmouth and Cleveland Habitat site	Consultation with pipeline operators Risk assessments and method statements for working near any MAH pipelines Use of CEMP and CDM controls during construction Utility searches and identification prior to any physical works	Yes
Technological or Manmade Hazards: Pollution accidents.	Striking of pipelines leading to a significant loss of containment event.	Loss of containment of hazardous substances leading to pollution of controlled waters or designated sites.	Consultation with pipeline operators Risk assessments and method statements for working near any pipelines Use of CEMP and CDM controls during construction Utility searches and identification prior to any physical works.	Yes
Extreme weather event	Flooding, heatwave, drought or storm	Risk to workers health or risk of damage to site infrastructure leading to physical harm or loss of containment	Climate resilience measures to be employed. Works to be conducted in accordance with the CEMP Site is predominantly in Flood Zone 1 so at low risk of flooding. Use of flood alerts and weather warnings	Yes

MA&D Category	Risk Description	Risk Event and Consequence	Embedded mitigation	ALARP?
			when timing construction activities.	
Ground risk/ collapse	Subsidence or structure collapse due to poor ground conditions or foundation design	Risk to workers health or risk of damage to site infrastructure leading to physical harm or loss of containment Risk of contaminant mobilisation from construction in and around the former landfill Risk of quay collapse	Ground investigation prior to construction and prior to finalising foundation designs Works to be conducted in accordance with the CEMP Ground improvements to be undertaken if required. Quay design to meet loading requirements for modules and operational infrastructure.	Yes
Road or marine traffic accident	Road traffic accident involving site HGVs Marine vessel accident	Risk to workers or public health or risk of damage to vehicles/ vessels leading to loss of containment	Use of Construction Traffic Management Plan (CTMP) Use of Construction Worker Management Plan (CWMP) Navigation Risk Assessment and agreement of vessel movements with Harbour Authorities. Marine licence for quay construction and operation.	Yes

Table 6-2 Potential MA&D Events (Operation)

MA&D Category	Risk Description	Risk Event and Consequence	Embedded mitigation	
Technological or Manmade Hazards: Industrial and Urban Accidents.	Fire or explosion.	Fire and/or explosion or release of harmful gas from plant systems that have over pressurised, or from biomass storage silos . Uncontrolled firewater run-off reaching controlled water and the internationally designated Teesmouth and Cleveland Habitat site	Process control systems and monitoring systems that meet BAT and are in accordance with the Environmental Permit and COMAH Licence provisions. Temperature and oxygen monitoring on storage silos Containment measures, bunding, kerbing and use of retention ponds to prevent loss of firewater. Compliance with appropriate design and safety legislation for pressurised systems. Use of preventative maintenance measures and regime.	ALARP?
Technological or Manmade Hazards: Pollution accidents.	Loss of containment leading to leak of toxic or asphyxiant gas (such as carbon dioxide, ammonia, nitrogen)	Toxic or asphyxiant gas cloud released on or off-site leading to potential worker or public exposure and health impacts	Process control systems and monitoring systems that meet BAT and are in accordance with the Environmental Permit and COMAH Licence provisions. Appropriately designed and rated pipework, valves and process equipment Compliance with appropriate design and safety	Yes

MA&D Category	Risk Description	Risk Event and Consequence	Embedded mitigation	
			legislation for pressurised systems. Use of preventative maintenance measures and regime.	
Technological or Manmade Hazards: Pollution accidents.	Loss of containment leading to leak of SAF, naphtha or hazardous chemicals into the environment	Pollution of controlled waters (e.g. river Tees or groundwater) or risk of harm to the Teesmouth and Cleveland Coast Ramsar/ SPA	Containment measures, bunding, kerbing and use of retention ponds to prevent loss of containment. Use of segregated drains for process areas. Process control systems and monitoring systems that meet BAT and are in accordance with the Environmental Permit and COMAH Licence provisions. Appropriately designed and rated pipework, valves and process equipment Compliance with appropriate design and safety legislation for pressurised systems. Use of preventative maintenance measures and regime.	Yes
Technological or Manmade Hazards: Pollution accidents.	Significant heat or radiation emission escaping from Site (e.g. from	Risk to public or workers health or risk of damage to site infrastructure leading to	Process control systems and monitoring systems that meet BAT and are in accordance with	Yes

MA&D Category	Risk Description	Risk Event and Consequence	Embedded mitigation	
	the flare, CHP Plant or SAF plant)	physical harm or loss of containment	the Environmental Permit and COMAH Licence provisions. Appropriately designed and rated vessels including design of flare to prevent thermal effects at ground level Compliance with appropriate design and safety legislation for pressurised systems. Use of preventative maintenance measures and regime.	
Technological or Manmade Hazards: Pollution accidents	Domino effect from incidents on neighbouring high hazard facilities	Risk to public or workers health or risk of damage to site infrastructure leading to physical harm or loss of containment	Distance to other COMAH existing facilities. Use of HSE Land Use planning tools (PADHI) for any future developments. If required, use of an area communications plan and warning system between nearby COMAH operators in the event that an incident did occur on any one site. See Section 19.7.	Yes
Extreme weather event	Flooding, heatwave, drought or storm	Risk to workers health or risk of damage to site infrastructure leading to physical harm	Climate resilience measures to be employed. Site is predominantly in Flood Zone 1 so	Yes

MA&D Category	Risk Description	Risk Event and Consequence	Embedded mitigation	
		or loss of containment	at low risk of flooding. Use of flood alerts and weather warnings when timing construction activities.	

7. Domino Effect

7.1 Overview

- 7.1.1 The Proposed Development will be subject to the COMAH Regulations (Ref 5), and professional judgement has been applied in defining the Zone of Influence (Zol), recognising the current design stage of the plant and equipment and consideration of Major Accident Hazards (MAH).
- 7.1.2 As the detailed design of the Proposed Development progresses (post FID), a full Safety Case Report will be prepared for submission to the HSE, specifying the MAH and the residual impacts demonstrating the application of ALARP techniques. The area around the Site includes several installations regulated under the COMAH Regulations and MAH pipelines regulated by the PSR (Ref 11) and COMAH requires the consideration of, “Domino”, effects with neighbouring assets.

8. Mitigation and Enhancement Measures

8.1 Overview

- 8.1.1 This section sets out the design, mitigation and enhancement measures in place to address the vulnerability of the Proposed Development to the risk of MA&D events.
- 8.1.2 The Applicant has committed to constructing and managing the Proposed Development in accordance with the following non-exclusive list of standards and systems, some of which will be required by secondary consents such as COMAH and operational phase Environmental Permit applications:
1. Programme of hazard studies for the Proposed Development to demonstrate that risks can be managed to be ALARP;
 2. Environmental, Health & Safety Management systems to be developed for the operational facility;
 3. CDM Health & Safety Plan (relevant to Construction phase only);
 4. Supplier management environmental, health & safety standards (e.g. Construction Skills Certification Scheme);
 5. A CEMP will be used during the Construction Phase to control environmental effects (an outline CEMP will be submitted as part of the application for development consent);
 6. Marine licence for quay construction; and
 7. Operation of the plant will be regulated through an Environmental Permit and a Marine Licence.

9. Residual Effects and Conclusions

9.1 Overview

- 9.1.1 Based on the anticipated control and embedded mitigation measures to be used for the Proposed Development, it is considered that the identified potential MA&D events identified as having the potential to occur during the construction, operation and decommissioning phases will all be managed to be ALARP.

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