Shannon Technology and Energy Park (STEP) Power Plant

Environmental Impact Assessment Report - Volume 2

Chapter 14 Major Accidents and Disasters

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Delivering a better world

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Table of Contents

14. Major Accidents and Disasters 14-3
14.1 Introduction 14-3
14.2 Competent Expertise 14-4
14.3 Regulatory Overview 14-4
14.3.1 Legislation 14-4
14.3.2 Policy 14-6
14.3.3 Guidance 14-6
14.3.4 Definitions 14-6
14.4 Overview of Proposed Development 14-8
14.4.1 Description of Proposed Development 14-8
14.4.2 Site Location 14-10
14.5 Methodology 14-13
14.5.1 Potential Impacts 14-14
14.5.2 Hazardous Substances and Operations 14-15
14.5.2.1 Construction Phase 14-15
14.5.2.2 Commissioning Phase 14-16
14.5.2.3 Operational Phase 14-16
14.5.2.4 Decommissioning Phase 14-18
14.5.2.5 Consequence Modelling 14-18
14.6 Identification of Potential Accidents 14-19
14.7 Identification of Potential Disasters 14-28
14.8 Assessment of Major Accidents and Disasters 14-37
14.9 Mitigation Measures 14-44
14.10 Emergency Management 14-45
14.11 Cumulative Impacts and Effects 14-45
14.12 Residual Impacts and Effects 14-47
14.13 Summary 14-47
14.14 References 14-49

Figures

Figure 14.1: Proposed Development Layout 14-9

Tables

Table 14.1: Screening Assessment Dangerous Substances and Major Accident Hazards (MAH) . 14-20
Table 14.2: Screening Assessment of Potential Disaster Scenarios 14-29
Table 14.3: Assessment of Major Accidents 14-38

14. Major Accidents and Disasters

14.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) assesses the potential Major Accidents and Disasters (MA&Ds) scenarios which are pertinent to the Proposed Development, taking into consideration the materials, operations and location of the Proposed Development and associated facilities.

The Site is located in the townlands of Kilcolgan Lower and Ralappane, between Tarbert and Ballylongford, Co. Kerry. The application Site boundary ('red line') encloses an area of approximately 41 hectares (ha) and is entirely owned by the Applicant.

MA&Ds are incidents which can result in immediate or delayed significant harm to human health and / or the environment and require the use of resources beyond those of the proposed developer or its contractors to manage, such as the emergency services. In the context of this assessment, major accidents are typically anthropogenic in nature and include for example, the accidental loss of containment of significant quantities of dangerous substances such as natural gas and gas oil, leading to fires and / or explosions. Disasters are typically naturally occurring events, such as earthquakes, landslides and flooding, and can also include manmade or external hazards such as acts of terrorism.

In this assessment, the MA&Ds pertinent to the Proposed Development are identified and qualitatively assessed to determine the potential impact on the following receptors:

- Population and human health.
- Biodiversity, with particular attention to species and habitats protected under The Habitats Directive (EU Council Directives on Birds and Habitats (Council Directive 92/43/EEC)).
- Land, soil, water, air and climate.
- Property and material assets, cultural heritage, and the landscape.

The assessment of MA&Ds considers the full lifecycle of the Proposed Development, from construction, through operation, maintenance, and the eventual decommissioning and demolition of the facilities.

Credible MA&Ds scenarios which are identified are termed 'Risk Events' and the mitigation measures to reduce these risks are considered. These measures include the engineering design and operational controls to prevent MA&Ds, and if Risk Events were to occur, reduce their impact and severity. Mitigation measures are therefore considered, along with the anticipated emergency management arrangements which would be initiated if the event occurred.

For each Risk Event, the qualitative assessment contained in this chapter will conclude if sufficient measures are in place to reduce risks associated with reasonably foreseeable worst-case impacts to acceptable limits, or if further mitigation is required.

This chapter contains an overview of the regulatory requirements to identify and assess major accidents and disasters. The methodology for identification of such is initially by consideration of the substances which will be present onsite, and which have the potential for major accident, by virtue of their chemical

or physical properties. Substances which have the potential to initiate and / or contribute to a major accident will be identified within this chapter for qualitative assessment.

The potential for natural disasters such as flooding and seismic events is primarily determined by the location of the facilities.

Full details on the background, Site history and the Proposed Development is provided in **Chapter 02** (Description of the Proposed Development) and also the Planning Statement submitted with this planning application.

14.2 Competent Expertise

This chapter has been prepared by a team including:

Dr Alex Freeman has a degree in Environmental Biogeochemistry from Glasgow University, a PhD. in Environmental Geochemisty from University of Edinburgh, and twenty two years of consultancy experience in both the UK and US for industrial clients designing and implementing ground investigations and groundwater remediation schemes, conducting due diligence and environmental compliance audits, preparing environmental permit applications and surrenders and preparing MADS chapters for DCOs / EIARs for power stations across the UK and Ireland including carbon capture and hydrogen schemes. Alex has also authored technical guidance for UK government agencies on topics including waste to land and DSEAR risk assessments.

Bob Hudson has a degree in Chemistry from Imperial College, post graduate diploma in Biochemical Engineering from Teesside University, and a Masters degree in Integrated Pollution Control from UMIST, and thirty five experience including work as a regulator (HMIP / EA), industrial manufacturer (Tioxide / bp) and consultant with three different environmental engineering consultancies.

14.3 Regulatory Overview

This section identifies the relevant policy, legislation and guidance informing the scope of the assessment and sets out the requirements stipulated within Directive 2011/92/EU on the assessment iseof the effects of certain public and private projects on the environment as amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 (the EIA Directive).

14.3.1 Legislation

The assessment of the vulnerability of the Proposed Development to MA&Ds is included within EIAR following changes to EU legislation now transposed into Irish law within the revised EIA Directive 2014/52/EU and S.*I. No. 191 of 2020 - European Union (Environmental Impact Assessment) (Environmental Protection Agency Act 1992) Regulations (as amended by S.I. No. 421 of 2022).* These Regulations state the need to assess:

“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”’.

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

In accordance with the requirements of the Regulations, an assessment of the potential risks of MA&Ds relevant to the Proposed Development is required. This assessment shall consider the measures envisaged to prevent or mitigate significant adverse effects on the environment associated with these incidents and provide details of the preparedness for a proposed emergency response should they occur.

This assessment is a preliminary review, based on the current engineering design, drawings and documentation.

Further detailed hazard and risk analysis studies will be carried out throughout the project lifecycle. The engineering design of the project will be subject to formal process safety risk assessments, such as Hazard Identification (HAZID), Hazard and Operability (HAZOP) and Layers of Protection Analysis (LOPA) at the appropriate project / design stage(s). The purpose of these studies is to subject the design to a rigorous, structured assessment by suitably qualified, experienced people, to identify potential hazards. These hazards can then be subject to analysis to identify measures to manage the hazards and to reduce the level of risk.

Many regulations have been made which are of relevance to the control of MA&Ds of the Proposed Development, including the following:

- *Act No.10/2005* - Safety, Health and Welfare at Work Act (HSWA) (ISB, 2005). Including associated amendments:
    - *S.I. No. 231/2021* - Safety, Health and Welfare at Work (Chemical Agents) (Amendment) Regulations (ISB, 2021).
    - *S.I. No. 528/2021* - Safety, Health and Welfare at Work (Construction) (Amendment) Regulations (ISB, 2021).
    - *S.I. No. 255/2023* - Safety, Health and Welfare at Work (General Application) (Amendment) Regulations (ISB, 2023).
- Act No. 10/1972 (as amended by Act No. 21/1979) - Dangerous Substances Act (ISB, 1972).
- *S.I. No. 272/2008* - European Communities (Classification, Packaging, Labelling and Notification of Dangerous Substances) Regulations (CLP) (ISB, 2008).
- *S.I. No. 566/2012* - European Union (Large Combustion Plants) Regulations (ISB, 2012).

Another regulation of importance to the Overall Project and Proposed Development is the EU SEVESO III Directive (2012/18/EU) which is implemented in Ireland through the Chemicals Act (Control of Major Hazards Involving Dangerous Substances) Regulations SI. No. 209/2015 ("the COMAH Regulations"). This applies to sites, such as the Overall Project and Proposed Development, which store significant quantities of hazardous materials. The Proposed Development intends to store volumes in a quantity above the 'Lower Tier' and less than the "Upper Tier" COMAH qualifying thresholds. The Proposed Development will therefore be a Lower Tier Establishment.

14.3.2 Policy

The Department of Housing, Local Government and Heritage (DHLGH) as part of the Government of Ireland has published a series of guidance documents in line with their Major Emergency Management Framework in order to set out arrangements for co-ordination at local, regional and national levels of emergency management. The framework also introduces a system to immediately determine a lead agency in all emergency situations (DHLGH, 2022).

The Kerry County Development Plan (CDP) 2022-2028 (KCC, 2022), does not provide guidance regarding the assessment of MA&Ds but does refer to the implementation and control of Major Accident Hazard Sites, as defined by the SEVESO III Directive (2012/18/EU), within objective KCDP 9-91:

> *"Control the following, for the purposes of reducing the risk or limiting the consequences of a major accident (regard will be had to the provisions of the SEVESO III Directive and any regulations, under any enactment, giving effect to that Directive).*
>
> - *The siting of Major Accident Hazard sites.*
> - *The modification of an existing Major Accident Hazard site.*
> - *Specified development in the vicinity of a Major Accident Hazard site."*

14.3.3 Guidance

Key considerations for undertaking a MA&Ds assessment are provided in the European Commission: Guidance on the preparation of the Environmental Impact Assessment Report (EC, 2017).

There is no specific guidance available which sets out the approach for undertaking a MA&Ds assessment within an EIAR. However, the scope of the assessment has been developed with reference to the Institute of Environmental Management and Assessment (IEMA) publication "Major Accidents and Disasters in EIA: An IEMA Primer" (IEMA, 2020) which lays out emerging best practice.

Other guidance that is of relevance to the assessment of MA&Ds includes those published by the Environmental Protection Agency (EPA, 2022), the Health and Safety Authority (HSA, 2023) and the Chemicals and Downstream Oil Industries Forum (CDOIF, 2017).

As an emerging topic within environmental impact assessment (EIA), the IEMA, EPA, HSA, and CDOIF Guidelines provide useful guidance on the assessment of MA&Ds via the application of a process involving hazard identification via the consideration of typical guidewords, assessment of consequences and the consideration of means to eliminate or mitigate credible scenarios. The methodology used within this assessment is detailed in **Section 14.5.**

14.3.4 Definitions

For the purpose of this assessment, the definition of a 'Major Accident' is taken from the guidelines on MA&Ds within the IEMA Primer (IEMA, 2020).

"A major accident is an event (for instance, train derailment or major road traffic accident) that threatens immediate or delayed serious environmental effects to human health, welfare and / or the environment

and requires the use of resources beyond those of the client or its appointed representatives (i.e., contractors) to manage".

Major accidents can be caused by disasters resulting from both man-made and natural hazards.

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 that meets the definition of a major accident.

In general, major accidents and / or disasters should be considered as part of an assessment where the development has the potential to cause the loss of life, permanent injury and/or temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration".

The Proposed Development will be classified as a 'Lower Tier' COMAH Establishment and the criteria for a major accident, listed in Schedule 6 of the COMAH Regulations (Regulation 19(2)), are appropriate for consideration in this assessment. These criteria (for a major accident) are listed below.

- An injury to a person which is fatal.
- Up to six persons injured within the establishment and hospitalised for at least 24 hours (hrs).
- One person outside the establishment hospitalised for at least 24 hrs.
- A dwelling outside the establishment which is damaged and unusable as a result of the accident.
- The evacuation or confinement of persons for more than 2hrs where the value (persons × hrs) is at least 500.
- The interruption of drinking water, electricity, gas or telephone services for more than 2hrs where the value (persons × hours) is at least 1,000.
- Permanent or long-term damage to terrestrial habitats:
    - 0.5 hectares (ha) or more of a habitat of environmental or conservation importance protected by legislation; or
    - 10 or more hectares of more widespread habitat, including agricultural land.
- Significant or long-term damage to freshwater and marine habitats:
    - 10 km or more of river or canal.
    - 1.0 ha or more of a lake or pond.
    - 2.0 ha or more of delta; or
    - 2.0 ha or more of a coastline or open sea; or
    - Significant damage to an aquifer or underground water: 1.0ha or more.
- Damage to property in the establishment, to the value of at least EUR 2 million.
- Damage to property outside the establishment, to the value of at least EUR 500,000.

14.4 Overview of Proposed Development

14.4.1 Description of Proposed Development

A detailed description of the Proposed Development is contained in **Chapter 02** (Description of the Proposed Development) and the following section lists the key features.

The Proposed Development will consist of the following main components, summarised as follows:

- Three (3 No.) blocks of Combined Cycle Gas Turbines (CCGT), each block with a capacity of approximately 200 megawatts (MW) for a total installed capacity of up to 600 MW.
- A 120 MWh (1-hr) Battery Energy Storage System (BESS).
- High voltage 220 kV GIS Substation.
- Auxiliary Boiler.
- Raw water treatment and storage.
- Firewater storage tanks and fire water pumps.
- Ancillary buildings.
- Secondary Fuel Offloading and Storage, consisting of;
  - Two storage tanks, each with a capacity of 5,000 m^3 (10,000 m^3 in total).
  - Three day-storage tanks each with an approximate capacity of 2,000 m^3 (6,000 m^3 in total).
- Above Ground Installation (AGI) compound.

Figure 14.1 shows the layout of the Proposed Development.

Figure 14.1: Proposed Development Layout

The Proposed Development (Power Plant) will operate using natural gas as its primary fuel and is designed to operate alongside intermittent renewable electricity power generation. It is expected to mainly operate at full capacity during periods of low renewable supply, and otherwise to be turned down or turned off.

The BESS will assist in providing electricity to the grid during start-up of the Combined Cycle Gas Turbines (CCGT), once they are operating at the necessary capacity the BESS will be switched off and recharged. The BESS can also charge from the grid. For example, if there were high renewable generation levels on the Irish power system at any one time, the BESS could charge from the grid instead of the power plant (Section 2.3.2 Chapter 2 Project Description).

Natural gas will be delivered to Site via a consented 26 km natural gas pipeline facilitating connection [Planning Reference GA08.GA0003] from the Site to the Gas Network Ireland (GNI) transmission network west of Foynes. This will generate power to be exported via the 220 kV connection to the national electricity grid.

The Proposed Development also consists of secondary fuel storage and offloading which will supply distillate oil for a minimum of five continuous operating days (approximately 10,000 m^3), as required by '*Secondary Fuel Obligations on Licensed Generation Capacity in the Republic of Ireland' (CER/09/001*), issued by the Commission for Regulation of Utilities (CRU). This reserve will only be used in the event

that the gas connection is unavailable and generation on the grid cannot meet demand. The total reserve consists of two storage tanks (~5,000 m^3 each) and three day-storage tanks (~2,000 m^3 each) with a combined capacity of approximately 16,000 m^3. Tertiary containment, bunding and associated pipework will be designed in accordance with EPA Guidance Note on Storage and Transfer of Materials for Scheduled Activities. The tanks will be located in a bunded area, which will allow for either 110% of the largest tank within the bund or 25% of the total volume of substance within the bund, whichever is the larger, in accordance with CIRIA C736, *Containment systems for the prevention of pollution: Secondary, tertiary and other measures for industrial and commercial premises, (*CIRIA, 2014).

The distillate oil will be supplied to the Site by HGV tanker at an unloading station adjacent to the storage tanks, which will feed the distillate oil into one of the three day-tanks.

The planning application boundary of the Proposed Development is shown by the redline in **Figure 14.1**. The quantity of distillate and natural gas present within this boundary has been assessed to be above the Lower Tier, and less than the Upper Tier, qualifying threshold at which regulation under the Chemicals Act (Control of Major Accident Hazards (COMAH) involving Dangerous Substances) Regulations 2015, S.I. 209, will apply. The Proposed Development will therefore be a Lower Tier Establishment. . Compliance with the COMAH Regulations places a number of duties on the operators of installations. These include the following:

- Lower Tier and Upper Tier – Preparation of a Major Accident Prevention Policy (MAPP).
- Lower Tier – Preparation and Implementation of a Safety Management System (SMS).

Consultation with the HSA has been ongoing throughout the design development of the Proposed Development. COMAH notifications and documentation will be submitted for regulatory review at the appropriate juncture.

The COMAH SMS (Lower Tier) will include a detailed description of the technical standards used in the design of process, mechanical, electrical and civil engineering equipment and structures. These include International and European standards such as:

- The National Fire Protection Association (NFPA) suite of Recommended Practise (RP) documents, specifically NFPA 850: RP for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations.
- Institution of Gas Engineers and Managers suite of standards, including IGEM/ SR/ 16 Edition 2 - Odorant systems for gas transmission and distribution.

14.4.2 Site Location

The Proposed Development is located on a site adjacent to the Shannon Estuary, between Tarbert and Ballylongford in Co. Kerry.

The Site is zoned as industrial by Kerry Co. Co. (Kerry CDP 2022-2028) and supports the progress of strategic energy projects along with the expansion of the gas network (Objective KCDP12-3). The Proposed Development is in alignment with local, regional and National policies, as specified within **Chapter 04** (Policy, Energy and Planning).

The Site is located approximately 4.5 km from Tarbert and 3.5 km from Ballylongford in Co. Kerry. This area is characterised by predominantly improved grassland in an agricultural setting. Field boundaries predominantly consist of hedgerows with small drainage ditches. A small section of the Ralappane Stream which runs in a north westerly direction, discharging into the Shannon Estuary, is located in the most southern part of the Site. The L1010 (Coast Road) is located to the south of the Site.

There are a small number of residential properties located within 500 m of the Site and additional residential properties located along the L1010 road. The nearest COMAH Establishments to the Site are as follows:

- The decommissioned SSE Tarbert HFO Power Station which is approximately 5 km east of site.
- The National Oil Reserves Agency (NORA) facility, known as the Mainland Tank Farm, which is also approximately 5 km east of site. SSE Tarbert HFO Power Station and the NORA facility are both Upper Tier COMAH installations and adjacent to one another.
- Moneypoint Power Generating Station, which is an Upper Tier COMAH installation, located on the northern shore of the Shannon Estuary, approximately 3 km to the north of the Site.

The main site of the Tarbert Power Station has been decommissioned but is expected to be refurbished during 2024 such that it will continue operations using Hydrogenated Vegetable Oil (HVO) as its Primary fuel instead of Heavy Fuel Oil (HFO). It is currently unclear what, if any, COMAH status will be assigned to the redeveloped site. During this transition, to ensure power can still be supplied to the grid, the station is currently constructing a Temporary Emergency Generating (TEG) facility to run on distillate fuel.

The Moneypoint Power Station is the Republic of Ireland's largest, and only coal-fired power station. However, the power station is expected to cease coal burning activities as of 2025 and will instead operate using HFO from 2025 to 2029. During this period the power station will only operate to compensate for shortfalls in generation capacity that threaten consumer supply.

There is no local Fire station within the environs of the Proposed Development. A firewater system will be installed within the Proposed Development including fire water storage and fire pumps. Additional mobile resources such as fire tenders will be considered along with provision of specialist training to site personnel.

There are a number of designated environmental sites in the area of the Proposed Development, including the Lower River Shannon Special Area of Conservation (SAC), which is adjacent to the Site, along the northern / north-western boundary and also along part of the eastern boundary. The Ballylongford Bay proposed Natural Heritage Area (pNHA) is adjacent to a part of the north-western boundary of the Site. The Lower River Shannon SAC and the River Shannon and River Fergus Estuaries Special Protection Area (SPA) extend along the north-western shoreline boundary of the Site. These sites are identified within **Figures F7.1** and **F7.2** in Volume 3.

The Proposed Development is not located within a groundwater drinking water source protection area. A search of the Geological Survey of Ireland well records found no springs and a relatively small number of low-yielding groundwater abstraction wells recorded between 1 and 2 km from the Site. These

groundwater abstractions are likely to be wells serving single houses or farms and all are hydraulically up gradient of the Site and therefore are unlikely to be impacted by the Proposed Development.

Surveys and test trench excavations have been carried out to inform previous planning applications on the Site. The surveys and test trenches were carried out to assess the presence of areas of archaeological potential. A ringfort (fortified settlement dating approximately to the Bronze Age) has been identified. These sites are constructed from earth and stone, and largely buried, therefore they are not considered to be vulnerable to the potential major accidents and disasters pertinent to this Proposed Development.

The Proposed Development will source local materials such as rock and stone for use during construction, with materials such as concrete and tarmac also being used. Lime and concrete (specifically, the cement component) is highly alkaline and any spillage which migrates through subsoil could impact groundwater quality, therefore a Construction Environmental Management Plan (CEMP) will be produced for the construction phase, refer to CEMP in **Appendix A2.3** of Volume 4, and will incorporate measures for safety and environmental protection during the construction of buildings, pipelines and concrete structures, such as pavements and culverts.

The onshore operational equipment will be enclosed within a security fence provided with pedestrian and vehicular access. The AGI compound will be remotely operated and normally no personnel will be present in this area.

The access road levels will be profiled to drain road runoff to an engineered swale adjacent to the road, the majority of which will drain to the engineered storm drainage system at the Power Plant site and discharge to the shared constructed outfall to the Shannon Estuary.

There will also be a stormwater discharge point at the Ralappane D1 stream crossing, located 50 m from the Site entrance (Drawing Ref: 198291-1STF-S3001), and a second stormwater discharge point will be located at the D2 stream crossing located 20m from the construction laydown area (Drawing Ref: 198291-1STF-S3002). Both will be fitted with Class 1 hydrocarbon interceptors.

All rainwater drainage falling on paved surfaces will pass through Class 1 hydrocarbon interceptors, which will be installed upstream of each stormwater discharge point. The interceptors will collect any accidental spills of fuels or oils used in vehicles onsite.

Spill kits will be located at strategic points around the Proposed Development to ensure a quick response to any spillages should they occur. Any used spill kits will be disposed of using a hazardous waste disposal contractor and in accordance with all relevant EU and Irish waste management legislation (*i.e.* the Waste Management Acts 1996-2011 and any regulations made thereunder, and the Waste Framework Directive).

A firewater retention pond is included in the Proposed Development and sized according to the EPA *Guidance on Retention Requirements for Firewater Runoff (2019)*, as the most effective and suitable measure for retaining firewater. The retention pond will be rendered impermeable by use of an appropriate liner, and integrity-tested in line with the requirements of the Site's licence. All drainage will pass through the retention pond. An automatic shut-off valve linked to the site's fire detection system will be installed on the drainage outlet point.

The EPA Guidance Note 'Storage and Transfer of Materials for Scheduled Activities' (EPA, 2013) shall be taken into account when designing material storage and containment onsite.

14.5 Methodology

The assessment of MA&Ds has been based on the application of a standard hazard identification and risk assessment methodology, which is typically applied at COMAH Installations and follows the IEMA Primer and EPA guidance where applicable.

Reference has been made to the guidance provided by the CDOIF Guideline, Environmental Risk Tolerability for COMAH Establishments.

The methodology aims to identify credible hazard scenarios, which are pertinent to the Proposed Development by virtue of the substances present, operations carried out and the geographic location. For each scenario identified, the precautionary measures associated with these hazards are taken into consideration and the residual risk is assessed. Following implementation of mitigation measures, the residual risk should be commensurate with a level considered by the Health and Safety Authority and EPA to be 'as low as reasonably practicable' (ALARP).

A proportionate, precautionary approach has been used in this assessment, based on the relative likelihood of the credible hazardous scenarios identified. A greater level of detail will be applied to the assessment of scenarios, which are considered more likely to occur, or to scenarios with potentially more significant consequences.

The approach used in this assessment is summarised as follows:

- Identify the hazardous substances which could be present over the lifecycle of the Proposed Development. These include flammable substances, materials harmful to the environment and materials harmful to human health.
- Consider the quantities and storage arrangements associated with these substances and the operations carried out at the Proposed Development involving these materials.
- Identify the credible major hazard scenarios associated with these materials and operations.
- Assess the location and vulnerability of the Proposed Development to hazards as a result of infrastructure, climatic conditions and geological events.
- In general, credible MA&D scenarios will fall into one of three categories:
    a) events that could not realistically occur, due to the substances present, the type of development or its geographic location;
    b) events that could realistically occur, but for which the Proposed Development, and associated receptors, are no more vulnerable than any other development; and
    c) events that could occur, and to which the Proposed Development is particularly vulnerable, or which the Proposed Development has a capacity to exacerbate.
- Where credible major accident or disaster scenarios are identified, describe the potential for any change in the relevant environmental and human health receptors in qualitative terms.

- Describe the mitigation measures which will be adopted during the design, construction and operation of the Proposed Development, to provide documented evidence to support and demonstrate that likely effects have been mitigated or managed to an acceptable level.

Sections 14.6 and **14.7** contains a screening process to identify the credible Risk Events for further consideration. The specific mitigation measures associated with each Risk Event are presented and the general mitigation measures to reduce risk are discussed in **Section 14.9**.

14.5.1 Potential Impacts

The potential hazards associated with substances present at the Proposed Installation, which are described in **Table 14.1** and have the potential for a major accident, are summarised in the following section. All the identified hazards listed below require a loss of containment to occur, such as catastrophic damage or failure of pipework or equipment.

- Fire:
  - **Flash Fire:** A flash fire can occur following a loss of containment of flammable liquid, vapour or gas which results in a flame which passes through the mixture at less than sonic velocity such that explosion overpressures are negligible. A flash fire may be caused by releases at high or low pressure into an open, unconfined area which contacts an active source of ignition.
  - **Jet Fire**: A jet fire can occur following a loss of containment of high pressure gas, liquid or vapour released via a source such as a leak or failure of flanged pipework joints, pipework or another asset which contacts an active source of ignition.
  - **Pool Fire**: A pool fire involves the combustion of vapour from a pool of flammable liquid. It may occur within a clearly defined boundary or be unconfined. Flames generated by a pool fire are often accompanied by quantities of smoke with both flames and smoke orientated downwind.
- Explosion:
  - **Vapour Cloud Explosion (VCE)**: A loss of containment of flammable gas or vapour, which does not ignite immediately, may form a cloud of flammable material depending on the conditions of the release. If this cloud enters an area of confinement and contacts an active source of ignition, a VCE can result and generate potentially harmful overpressures.
  - Overpressures generated by explosions are related to the degree of confinement or congestion in the area in which the material is released. For example, in complex industrial structures with a lot of pipework and equipment in close proximity, the pressures generated are much larger than in open areas, due to the effect of these structures accelerating and / or reflecting the pressure wave.
  - **Boiling Liquid Expanding Vapour Explosion (BLEVE):** A BLEVE can occur if a storage vessel containing a flammable liquid held under pressure is heated to a temperature above its boiling point, for example, by exposure to a fire, which eventually causes the

vessel to rupture. Material released from the vessel will likely ignite, resulting in a fire and potentially harmful overpressures.

- Thermal Runaway:
  - A thermal runaway can occur if enough heat is supplied to a process that is accelerated by an increase in temperature, leading to further uncontrolled temperature increases. This reaction can significantly increase the severity of fires and / or explosions by increasing their duration and / or area of effect.
- Major Accident to the Environment:
  - A loss of containment of liquids such as fuel oils which are accidentally released to water, land and / or groundwater in significant quantities can cause harm to the environment.

A detailed description of the properties of the hazardous substances and an assessment of their potential hazards is contained in **Sections 14.6** and **14.7**.

14.5.2 Hazardous Substances and Operations

14.5.2.1 Construction Phase

The identification of potential MA&Ds during construction considers the substances which will be present, and the typical activities associated with the works, such as demolition works, ground preparation, excavation, construction of buildings and process structures including bulk storage tanks and bunding.

The following substances will be present at the Proposed Development during construction:

i. Construction materials such as liquid concrete

This material can be harmful to human health and the environment and will present in significant quantities during construction, where it is used to construct buildings, site surfacing, equipment supports and other assets.

ii. Oxy-acetylene and nitrogen

These materials, contained in compressed gas cylinders, may be present on-site to carry out welding during construction activities.

iii. Diesel

Diesel will be stored in a temporary above ground bunded storage tank, for use in refuelling site activities.

Construction activities include works required to connect electrical power generated at high voltage (HV) at the Proposed Development to the transmission system via equipment such as transformers and switchgear. There are hazards associated with HV electricity, particularly during construction when work is carried out at or near to overhead power lines and underground cables. Contact with HV electricity can cause fatal injuries therefore must be carefully managed to control risks. An accident which causes an interruption to the supply of electricity to local residents and businesses could be within the criteria for a MA&Ds event. Major Accident and Disaster risks associated with these works will be identified within the MADs Chapter for the 220 KV works.

General demolition and construction activities, such as excavation, and construction of buildings and other structures will require the use of vehicles and tools. The hazards associated with activities include the potential for vehicle impact, particularly during reversing and vehicle overturning. The controls around this work will be carefully managed via risk assessment to control the risks to people, the environment and the existing operational areas.

A further risk during construction is the potential for a spill / loss of containment of fuel during refuelling of site vehicles which could pose a risk to the environment. This risk will be mitigated through the adoption of safety controls detailed in the CEMP.

14.5.2.2 Commissioning Phase

Potential MA&Ds during commissioning activities involve the same hazardous substances as the operational phase, but with a higher risk profile due to the one-off nature of the some of these activities (i.e. charging the storage vessels, testing of the critical safety equipment such as shutoff valves). Commissioning procedures, including details of any mitigation measures, should be detailed in a commissioning report which is typically required to support both the Environmental Permit and the COMAH reporting and will require approval from HSA and EPA.

As well as the substances present at the Proposed Development during operation as detailed in **Section 14.5.2.3**, the following substances will be present at the Site during commissioning of the Proposed Development, the MA&Ds scenarios associated with each material are considered in **Table 14.1**.

i. **Compressed Nitrogen**

   This material will be used at the Proposed Development for gassing up and dewatering of the pipelines to ensure it is suitable for safe operation. This material will also be used during operation to purge the pipeline for integrity testing and may be used for other maintenance activities such as pigging.

ii. **Propane**

   Propane is commonly used in pilot ignition systems for combustion plants and as reference gases in the continuous emissions monitoring systems installed within the stack(s).

14.5.2.3 Operational Phase

The identification of potential Major Accidents during operation considers the substances present at the Proposed Development, identifying those which are potentially dangerous, such as flammable materials and substances toxic to human health and / or the environment. The assessment also considers the equipment in which these substances will be stored and used.

The following substances will be present at the Proposed Development during operation, the MA&Ds scenarios associated with each material are considered in **Table 14.1.**

i. **Compressed Natural Gas**

   This will be the main fuel source used at the Proposed Development. This will be supplied to the Site using a 26 km underground pipeline from the national gas transmission network. The

majority of pipework at the site will also be underground other than a short section of the gas import pipeline to allow for connection to a bi-directional pig-trap.

ii. Distillate Oil

This is the secondary fuel source, which will be stored at site to be used if natural gas cannot be supplied to the Site and the generation to the grid cannot meet demand. This substance will be stored using three 2,000 m^3 (day tanks) and two 5,000 m^3 (bulk) storage tanks for a total capacity of 16,000 m^3, which should allow for at least five days of continuous operation. Distillate Oil will be supplied to site by HGV tankers, which will connect to one of the three 2,000 m^3 storage tanks. It is not envisaged that distillate oil would not be used in the normal course of events other than for about three hours per annum for test firing.

iii. Lithium and other metals / hazardous materials

Lithium will be used in the sites BESS, which will occupy a 33.9 m by 163 m area and comprise of 27 battery containers, each with a capacity of 4.5 MWh and dimensions of 6.5 m x 2.4 m x 2.5 m (L x W x H). Other hazardous materials may be included in the BESS dependent on the type of battery used, including chemicals containing fluoride and chloride.

iv. Acidic and caustic substances

These materials are typically used for water treatment works to create demineralised water for steam cycle makeup for each CCGT. Dependent on the volume required, these will be stored in aboveground storage tanks (ASTs) with appropriate secondary containment (110%) and segregation.

The following substances may also be present on the Site, albeit in much smaller quantities:

- Gas Oil (Diesel) will be stored in a storage tank on Site as part of the Sites containerised fire water module which includes an emergency diesel fire water pump, as well as a storage tank for a stand-by diesel powered electrical generator, used for the CCGTs electrical and control equipment. Diesel will also be used in HGVs for onsite operational traffic and transport (e.g., for distillate oil fuel deliveries).
- Hydrogen compressed gas stored in pressurised cylinders, commonly used as a coolant in the gas combustion turbine generator cooling system.
- Oxyacetylene and nitrogen contained in compressed gas cylinders may be present on-site to carry out welding when operational during maintenance activities.
- General oils and lubricants for rotating machinery.
- Carbon dioxide (CO_2) compressed gas for fire suppression, where water / foam cannot be used.
- Biocides and corrosion inhibitors are materials often used at power generation facilities, which incorporate steam systems in order to treat water used in the steam system..

All materials will be safely contained on Site within dedicated storage tanks or appropriate areas / cages, *i.e.,* compressed gas cylinders. All materials will be stored in suitably bunded areas with weather protection and will be inspected regularly.

Firewater runoff could be generated on-site during a major accident. In the event of a major fire on-site, water potentially containing a foam concentrate could be applied to extinguish fires within the distillate oil fuel storage area. Firewater generated in such an incident could contain a mixture of materials that are harmful to the environment if allowed to enter the ground and groundwater. These include un-combusted distillate oil, products of combustion etc. Consequently, firewater runoff is considered as a potentially dangerous substance in this assessment.

The CCGT system comprises a large combustion engine, which mixes compressed air with natural gas or distillate oil fuel, the energy released from combustion is then used to heat water making steam which subsequently drives a steam turbine to generate electricity. The system is housed within an enclosure to provide a controlled environment, which incorporates pressurised systems to prevent the ingress of external hazardous materials such as dusts and flammable gases.

The CCGT systems use well established technology and are in operation within many facilities worldwide, as they provide an efficient means of generating electricity very quickly. There are however recognised hazards associated with their use as they comprise complex, high speed mechanical components and operate at high temperatures and pressures, with a flammable mixture of fuel in air. These systems must be carefully managed and controlled via safety systems; therefore, the use of this equipment is considered in the assessment of potential major accidents.

14.5.2.4 Decommissioning Phase

When decommissioning takes place, all above-ground equipment associated with the Proposed Development will be emptied, cleaned, disassembled and removed from the Site. However, prior to the removal of plant, all residues and operating chemicals will be cleaned out from the plant and recycled or disposed of at a suitably licenced facility. The majority of the plant and equipment will have some limited residual value as scrap or recyclable materials and will be recycled at the time.

Contamination prevention is a requirement of the IE licence during the lifetime of the licence, *i.e.* during construction, commissioning, the operational phase and the decommissioning phase. Therefore, the Proposed Development has been designed to prevent new areas of ground from being contaminated or pathways to receptors as a result of construction or operation. Once the plant and equipment have been removed to ground level, the hardstanding and sealed concrete areas will be left in place. This is a recognised demolition practice.

Method statements and risk assessments for the demolition activities will be key mitigation measures adopted during the eventual decommissioning phase of the Proposed Development.

In addition to these measures, other general safety controls will be incorporated into a Decommissioning Plan (including a Decommissioning Environmental Management Plan (DEMP)) which will be produced when required and agreed as part of the Industrial Emissions (IE) licence of the Site and site surrender process.

14.5.2.5 Consequence Modelling

A Quantitative Risk Assessment (QRA), including consequence modelling, was carried out for the Proposed Development in 2021 and updated in 2024, with regards to offsite impacts related to land use planning. This involved the impact assessment on offsite receptors of natural gas and diesel fuel fires

and explosions, through pipeline and vessel storage losses. The QRA employed HSA guidance for credible release scenarios and the embedded data on frequency of loss and probability of ignition. The consequence modelling involved the use of proprietary modelling software (DNV SAFETI – version 8.9) to identify impact contours that are consistent with the three Land Use Planning (LUP) contours, used to assess developments relative to offsite receptors. The results showed that there were no incompatible land uses near the site for the three LUP zones and that the individual risk at nearby residential properties is negligible. There were no populated areas within any of the LUP risk curves and so the societal risk was not calculated but is considered negligible. No lethality is expected in populated areas near to the site.

14.6 Identification of Potential Accidents

The substances associated with the Proposed Development, which are potentially dangerous and could therefore be a credible source of Major Accident Hazard (MAH) during the lifecycle of the development, are described in **Table 14.1**.

Substances are generally classified in accordance with the Classification, Labelling and Packaging (CLP) Regulations (EC, 2008). This is a harmonized system of identifying the hazardous properties of materials, for example those which are flammable, toxic and harmful to the environment. Where substances are not classified by CLP, for example, wastes, the general characteristics are considered in order to determine the potential for a Major Accident Hazzard (MAH).

This assessment considers the potential interactions of substances present on the Proposed Development, which could potentially create harmful materials or the release of energy.

Where substances are identified as being dangerous by their properties, the means by which they could result in harm is then considered. Where there is the potential for a MAH, this is identified for further assessment, which is contained in **Table 14.3**.

Where a major fire and / or explosion could cause harm both on and offsite, this would be considered as a MAH. This aligns with the criteria for the notifiable incident referred to in Regulation 20 the COMAH Regulations, which is a fire involving a dangerous substance that may result in suspension of normal work in the establishment for more than 24 hours (Government of Ireland, 2015).

If a release of a dangerous substance resulted in significant damage to the environment or property, this would be considered a MAH. The Guideline on Environmental Risk Tolerability for COMAH Establishments (CDOIF, V2 March 2016) contains information on the severity of harm at sensitive receptors resulting from accidents, which might be considered to be a Major Accident to the Environment (MATTE). This guidance has been taken into consideration in the review of releases within **Table 14.1**.

As the Proposed Development will be required to notify as a COMAH site, the principals of the COMAH Regulations have been used to identify and assess scenarios which could result in a MAH or MATTE. These principals present a clear and robust methodology for facilities where substances such as natural gas are present.

Table 14.1: Screening Assessment Dangerous Substances and Major Accident Hazards (MAH)

Substance	Description of use	CLP Hazard Classification	Screening and Identification of Potential Major Accident Hazard	Further Assessment Required (Y/ N)
Natural Gas	Gaseous hydrocarbon mixture, predominantly methane, supplied to the site using a 26 km pipeline from the National Gas Transmission Network. Natural Gas is then forwarded to the CCGT where it is used for energy generation.	H220 - Extremely flammable gas. H280 - Gas under pressure; may explode if heated. H380 - May displace oxygen and cause rapid suffocation.	In the event of emergency depressurisation of a section of the process being required, the gas would be vented at a safe location where it would be dispersed by natural ventilation. However, in the event of accidental damage to the natural gas pipeline or other gas pipework at the Proposed Development, there is the potential for a release of a significant quantity of gas, which if ignited, can result in a flash fire or jet fire, which has the potential to cause harm to people via thermal radiation and inhalation of smoke. The impact of a flash fire or jet fire would likely be restricted to the immediate area, but such fires could result in ignition of offsite surface material i.e. peat, which can cause the heat to propagate underground and spread to the remaining pipework. A plume of smoke generated by a major fire would contain harmful substances such as particulate matter, however as the natural gas pipework is located in a well-ventilated area if there were an impact to the pipeline the smoke would likely surface where it can then disperse into air, and as such it is unlikely that this would have an impact beyond the immediate area. If a release of natural gas does not ignite immediately it may form a cloud, which could enter an area of confinement and contact an active source of ignition, causing a Vapour Cloud Explosion, which could generate potentially harmful overpressures. However, an impact to the pipeline would likely create an opening to the surface for natural gas to escape and as the area is well-ventilated it is unlikely for such a vapour cloud to form. Because of these hazards, there is the potential for a major accident scenario(s) associated with a significant loss of containment of natural gas, therefore this scenario is considered further in this assessment.	Y Risk Event 1

Substance	Description of use	CLP Hazard Classification	Screening and Identification of Potential Major Accident Hazard	Further Assessment Required (Y/ N)
Lithium and other metal ions and chemicals in BESS	Lithium ions and other metal ions are used within the Proposed Developments BESS, as well as organic substances which may include fluoride and chloride. There are 27 battery containers, each with a capacity of 4.5 MWh and dimensions 6.5 m x 2.4 m x 2.5 m (L x W x H)	These substances are non-classified by the CLP regulations, when cell enclosure and seals remains intact and the battery is operated in accordance with manufacturer recommendations.	In the event of accidental damage or malfunction of the batteries at the Proposed Development, there is the potential for the battery to ignite, which can lead to a thermal runaway, where the battery / batteries would self-generate more heat than can be dissipated. This can in turn affect surrounding batteries and result in a fire and or explosion. Accidental damage to the BESS may also result in the release of electrolyte and other gaseous toxic substances, such as carbon monoxide (CO), hydrogen chloride (HCl), hydrogen fluoride (HF), hydrogen cyanide (HCN), benzene, and toluene. The use of firefighting foam / firewater could then entrain these toxic substances in firewater, which could be hazardous to human health and the environment. The risk of propagating thermal runaway can be mitigated through appropriate separation of the individual cells within each battery container, and the use of warning sensors (e.g. temperature and carbon monoxide sensors) which could be used to isolate systems to minimise the risk of thermal runaway occurring. The battery containers themselves will also be appropriately separated within a 33.9 m by 163 m area to further minimise risk of fire spreading between containers. There is the potential for a major accident scenario associated with significant damage to the BESS, therefore this scenario is considered further in this assessment.	Y Risk Event 2

Substance	Description of use	CLP Hazard Classification	Screening and Identification of Potential Major Accident Hazard	Further Assessment Required (Y/ N)
Distillate oil	Distillate oil will be present at the Proposed site as a secondary fuel source in case of inability to supply natural gas to the Site. This is proposed to have a storage capacity of 16,000 m³ across five tanks.	H226 - Class 3 flammable liquid and vapour. H304 - May be fatal if swallowed and enters airways. H315 – Causes skin irritation. H332 - Harmful if inhaled. H350 - May cause cancer. H361d - Suspected of damaging the unborn child. H373 - May cause damage to organs through prolonged or repeated exposure. H411 – Toxic to aquatic life with long lasting effects	The credible scenarios which could result in a release of Distillate oil include the failure of or accidental damage to pipework, flexible hoses, storage tanks and transfer pumps, which could cause significant quantities of Distillate oil to be released. This scenario could also include the failure of containment systems within delivery vehicles (double skins) whilst on/travelling to Site. The maximum quantity of Distillate oil which could be released may be up to several tonnes, depending on the type of incident. In the event of accidental damage to the storage tank, HGV tankers or associated pipework, there is the potential for a release of Distillate oil to the surrounding environment. If it is released Distillate oil has the potential to cause a major accident, as it can cause major disturbances to the soil, groundwater and River Shannon, . If Distillate oil vapour is ignited, this can result in a pool fire, which has the potential to cause harm to people via thermal radiation and inhalation of smoke. The impact of a pool fire within a storage tank bund would be likely to be restricted to the Site, as high levels of thermal radiation would be unlikely at offsite receptors. A plume of smoke generated by a major fire would contain harmful substances such as particulate matter and potentially Sulphur Dioxide, however due to the size of the Distillate oil tanks, in the worst-case pool fire scenario the plume would be unlikely to extend for a significant extent offsite. Consequently, there is the potential for a major accident scenario(s) associated with a significant loss of containment of Distillate oil to the environment, therefore this scenario is considered further in this assessment as two risk events.	Y Risk Event 3 (Distillate spill) Risk Event 4 (Distillate Fire)

Substance	Description of use	CLP Hazard Classification	Screening and Identification of Potential Major Accident Hazard	Further Assessment Required (Y/ N)
Firewater – effluent generated during fire-fighting	In the event of a major fire, the application of firewater would be used to extinguish a fire and potentially to provide cooling to adjacent structures, preventing escalation of the incident. A foam concentrate additive would typically be used in a fuel pool fire scenario, which involved distillate.	Non-classified in accordance with CLP.	Firewater runoff would contain foam and other substances used for fire suppression along with products of combustion and un-combusted hydrocarbons. Modern foam concentrates do not contain substances classed as harmful to the environment; however, the firewater could contain products of combustion and un-combusted fuel. This material has the potential to cause harm if released to the environment. A firewater retention pond is included in the Proposed Development and sized according to the EPA Guidance on Retention Requirements for Firewater Runoff (2019), as the most effective and suitable measure for retaining firewater. The retention pond will be rendered impermeable by use of an appropriate liner, and integrity-tested in line with the requirements of the Site's licence. All drainage will pass through the retention pond. An automatic shut-off valve linked to the site's fire detection system will be installed on the drainage outlet point. Contaminated firewater would be collected for testing, treatment and disposal offsite at a suitable facility. There is the potential for a major accident scenario which involves the application of firewater and subsequent release to the environment due to the presence of the BESS. Although there are secondary and tertiary containment systems which will be installed at the Proposed Development, these may be insufficient to cope with the potentially large volume of water which may be needed to actively contain a thermal runaway event associated with the BESS. Additional fire suppression systems such as gas purging systems linked to temperature / carbon monoxide sensors may minimise the extent of a thermal runaway event and reduce the requirement for fire water. Water used in managing a thermal runaway event may contain other heavy metal ions and toxic substances such as hydrogen fluoride, which have potential to cause harm to human health and the environment. As such, there is potential for a major accident scenario involving a release of firewater which will be considered further in this assessment.	Y Risk Event 5 (Firewater from BESS)

Substance	Description of use	CLP Hazard Classification	Screening and Identification of Potential Major Accident Hazard	Further Assessment Required (Y/ N)
Gas Oil (Diesel)	Gas Oil (Diesel) will be used in the Sites Containerised Fire Water Module, which will contain a diesel fire pump and associated storage tank. In addition, there will be stand-by electrical generator(s) for secondary power supply to the CCGTs electrical and control equipment.	H226 - Flammable liquid and vapour. H304 - May be fatal if swallowed and enters airways. H315 - Causes skin irritation. H332 - Harmful if inhaled. H350 – May cause cancer. H373 - May cause damage to organs H410 - Very toxic to aquatic life with long lasting effects.	In the event of accidental damage to a diesel storage tank, or associated pipework, there is the potential for a release of gas oil (diesel) to the surrounding environment. If it is released, gas oil (diesel) has the potential to cause a major accident, as it can cause major disturbances to the soil, groundwater, and River Shannon, due to its high toxicity. If gas oil (diesel) vapour is ignited, this can result in a pool fire which has the potential to cause harm to people via thermal radiation and inhalation of smoke, this fire may also spread to nearby equipment containing flammable material such as natural gas and distillate oil, this may cause subsequent fires / explosions. The impact of a pool fire within a storage tank bund would be restricted to the Site, as high levels of thermal radiation would be unlikely at offsite receptors. A plume of smoke generated by a major fire would contain harmful substances such as particulate matter, however due to the size of the gas oil (diesel) tanks, in the worst-case pool fire scenario, the plume would not extend for a significant extent offsite. Although there is the potential for major accident scenarios to occur upon accidental release of Diesel, this is not considered a credible major accident scenario, as the quantities to be stored are relatively low. The containment systems which will be installed at the Proposed Development should be sufficient to prevent this material from reaching the environment or allowing an escalation to occur with neighbouring plant and equipment. Therefore, no specific scenarios involving a release of gas oil (diesel) are considered further in this assessment.	N
Nitrogen	Nitrogen is an inert gas. A small quantity of nitrogen will be continuously injected into the natural gas pipeline in accordance with the GNI gas specification requirements. Nitrogen will also be used during commissioning and maintenance operations to purge equipment and pipework.	Nitrogen is not classified as dangerous but can be harmful to people if a release occurs within confined, unventilated areas. It is a potential asphyxiant.	Nitrogen gas generation systems will be located in external, well-ventilated areas and therefore an accidental release would disperse readily. There is a potential asphyxiation risk, which may be brought about from accidental damage to pipework during commissioning and maintenance activities, however this is unlikely to cause any harm beyond the immediate area. As commissioning and maintenance activities will follow strict procedures laid out in documents such as the commissioning report and will only last a short time frame, it is unlikely that this substance will cause harm to people or the environment, and therefore a loss of nitrogen containment is not considered as a MAH.	N

Substance	Description of use	CLP Hazard Classification	Screening and Identification of Potential Major Accident Hazard	Further Assessment Required (Y/ N)
Concrete	Liquid concrete will be used in the construction of new facilities at the Proposed Development including buildings, surfacing and containment systems. Temporary storage systems will be present during construction of the Proposed Development and standard techniques will be used to pour cement onto prepared areas, for example, during the creation of tank bunds.	Typically non-classified in accordance with CLP.	Concrete is not classified hazardous in accordance with CLP; however, concrete paste is alkaline (pH 10-14) and therefore harmful to people if in contact with the skin or eyes. If concrete enters the environment via a release to water, it can raise the pH causing harm to aquatic ecosystems. Concrete released to the environment can also cause sedimentation on aquatic beds, which could harm flora and fauna. In the event of an accidental release occurring during construction, concrete/cement can raise the pH if released to water. Mitigation measures to prevent concrete reaching the Shannon Estuary are described in the Construction Environmental Management Plan (CEMP) and will be developed further in the Contractor's CEMP. This scenario is therefore not considered further in this assessment.	N
Lubrication and Hydraulic Fluids	Mineral and synthetic oils are typically used within equipment such as generators and compressors to provide lubrication for moving parts. These materials are typically delivered and stored in small containers such as drums, with a 210 litre capacity. Maintenance areas will be established for the storage of these substances, within fixed containment bunds.	Typically non-classified in accordance with CLP.	Lubrication and hydraulic fluids will be present on site in relatively small quantities and stored in suitable containment systems; to prevent accidental damage and to collect spilt materials should a failure of the storage vessel occur. In the event of failure of the storage vessel and secondary containment systems, there is the potential for a release of fluid; however the quantity would not be sufficient to reach environmental receptors or cause significant harm to people, and therefore would not result in a major accident. This scenario is therefore not considered further in this assessment.	N

Substance	Description of use	CLP Hazard Classification	Screening and Identification of Potential Major Accident Hazard	Further Assessment Required (Y/ N)
Compressed Gas Cylinders Typically including: Hydrogen Acetylene Propane	A small number of compressed gas cylinders containing hydrogen may be present on-site during operation as part of the power generator cooling systems. During construction and maintenance activities, welding may be carried out using compressed gases such as acetylene and oxygen.	H220 - Extremely flammable gas (Acetylene, hydrogen, propane). H280 – Gas under pressure (all gas cylinders).	The number of cylinders (and inherent gas volume) containing extremely flammable gas used on Site will be relatively low. In the event of accidental damage to a gas cylinder, pressure regulator or associated pipework, there is the potential for a release of gas. If the gas released is ignited, this could result in a fire / explosion. In the event of a fire onsite which escalates to areas where gas cylinders are stored, there is the potential for an explosion if the cylinders are exposed to thermal radiation. The consequences of a fire/ explosion could include harm to people if present in the vicinity of the cylinder(s) and damage to assets, potentially interrupting operation of the Proposed Development. Industry standard procedures will be used for the storage and use of gas cylinders, which reduces the risk associated with these systems to a low level. When not in use, cylinders will be stored in external, well-ventilated areas and when in use, appropriately certified equipment will reduce the potential for ignition if a flammable gas is accidentally released. Taking into consideration the small quantities of flammable gas stored in cylinders, which will be present on-site and the safety and security measures which will be in place to store and use them safely, it is considered that no credible major accident scenarios exist for these substances and are therefore not considered further in this assessment.	N
Compressed Gas Cylinders (non-flammable) Including Nitrogen CO_2.	A small number of compressed gas cylinders containing CO_2 will be installed to provide fire protection in enclosed areas of the turbine and generator. Nitrogen would typically be used during construction and maintenance activities to purge pipework and other uses.	H280 – contains gas under pressure	The number of cylinders containing nitrogen and CO_2 gas present on Site will be relatively low. In the event of accidental damage to a gas cylinder, pressure regulator or associated pipework, there is the potential for a release of gas. If gas is released within an enclosed area, this can cause harm to people present, potentially causing asphyxiation. The control measures for these substances are as described previously. Taking these into consideration along with the low numbers of cylinders which will be present, it is considered that no credible major accident scenarios exist for these substances and are therefore not considered further in this assessment.	N

Substance	Description of use	CLP Hazard Classification	Screening and Identification of Potential Major Accident Hazard	Further Assessment Required (Y/ N)
Power Plant Chemicals – Boiler Water (Steam) Treatment Plant	Substances are used to treat the boiler water systems within the Power Plant to control biological growth, prevent scale build up and to limit corrosion. In addition, any effluent discharges (boiler blowdown) will be pH adjusted using appropriate substances.	The substances used in these applications will be specified prior to operation and may include sodium hypochlorite (biocide), which is classified by CLP as harmful to the environment. Substances present in the Power Plant could include acids and alkalis for pH adjustment of liquids. These substances are typically classified as corrosive. Acids and alkalis are incompatible and shall be stored separately to avoid the potential of hazards caused by mixing.	The quantities of these substances will be typically a maximum of a few tonnes, stored in dedicated, bunded, storage tanks. In the event of an accidental release, this material will be contained in tank bunds and quickly detected by site personnel. If, however, the secondary containment systems (i.e. bunds) and tertiary containment systems (i.e. isolatable drains) both failed simultaneously, there will be minimal impact on people or the environment, primarily due to the small volumes of chemicals stored onsite. Consequently, no credible MAH/ MATTE scenarios for Power Plant (water treatment) chemicals have been identified.	N

14.7 Identification of Potential Disasters

The vulnerability of the Proposed Development to natural disasters such as flooding, earthquakes and the impact of climate change is substantially dependant on location. For example, highly unlikely events such as seismic events at the location of the Proposed Development have the potential to cause significant damage to assets and infrastructure such as the natural gas pipeline. These events can result in a loss of containment of natural gas leading to fires and / or explosions.

The design life of the Proposed Development is expected to be 25 years; therefore, adverse impacts associated with climate change, such as increased ambient temperatures, flooding and wind speeds, are pertinent and are also considered in this Section.

The Proposed Development is located close to the following facilities; the decommissioned SSE Tarbert HFO Power Station (5 km east of site) and NORA operated Tank Farm (also 5 km east of site) as well as the Moneypoint Power Plant (3 km north of the site). As such, there is the low risk of adverse events occurring at these facilities which escalates to have an impact at the Proposed Development. These scenarios are referred to in the COMAH Regulations as 'Domino Events' and are also considered in this section, along with accidents which are not directly related to the dangerous substances identified in **Table 14.1**.

Disasters such as major storms and significant seismic events have a low probability of occurrence, however the potential consequences can reach the highest level of significance as defined in **Section 14.3.4**.

The potential disaster scenarios which have been assessed for the Proposed Development are described in **Table 14.2**.

The potential impacts of disasters are well understood by engineers involved with all aspects of the design, construction, and operation of power stations such as the Proposed Development. These impacts are mitigated during the engineering design phase, for example, by the use of industry standard mechanical and structural design codes used for pipework, process equipment, supports and structural assets.

Taking into consideration the likelihood and consequences following the inclusion of mitigating measures, the overall risk of disasters occurring at the Proposed Development is considered to be very low but cannot be entirely eliminated. Consequently, additional measures associated with management of the Site such as operating procedures, accident prevention plans, and emergency response procedures will be in place prior to operation. These measures further reduce the risk and the consequences of disasters and are summarised in Section **14.9**.

Table 14.2: Screening Assessment of Potential Disaster Scenarios

Category	Description	Screening and Identification of Potential Major Accident / Disaster Hazard	Further Assessment Required (Y/ N)
'Domino Event' Accident - Industrial accident at NORA tank farm which escalates to new facility (and vice versa)	The Site is located approximately 5 km West of the NORA Tank Farm. An incident such as a fire at the Mainland Tank Farm could potentially impact the facilities associated with the Proposed Development and conversely, an event at the Proposed Development could reach the Mainland Tank Farm. This could result in an event which takes more resources to manage and has the potential to cause harm to people on Site, damage to property and assets. An explosion at the Mainland Tank Farm could generate overpressures. A plume of smoke generated by a fire on the Mainland Tank Farm could reach the air intake system of the CCGT, causing asset damage and has the potential to interrupt operations on site.	The scenarios which are associated with a major fire and / or explosion occurring at the Mainland Tank Farm would be initiated via a loss of containment of Heavy Fuel Oil via the same mechanisms as described for Distillate Oil at the Proposed Development in **Table 14.1** An incident at this facility such as a fire could result in significant damage at that location but would be unlikely to have a significant impact at the Proposed Development due to the separation distance of the sites. The impact of thermal radiation and explosion overpressure generated by an event at the NORA Tank Farm would not be considered to have a sufficient magnitude at the Proposed Development, therefore it would be unlikely to cause significant harm to people or assets at the Proposed Development. Consequently, whilst this scenario would be considered a potential disaster at the NORA tank Farm, is not considered further for the Proposed Development. The QRA prepared for Land Use Planning (LUP) for the Proposed Development, which includes consequence modelling, demonstrates that a fire and explosion at the Proposed Development will not impact the NORA Tank Farm and cause a Domino Effect at the NORA assets.	N

Category	Description	Screening and Identification of Potential Major Accident / Disaster Hazard	Further Assessment Required (Y/ N)
'Domino Event' Accident - Industrial accident at Tarbert SSE which escalates to new facility (and vice versa)	An incident such as a fire occurring at a neighbouring industrial site (not associated with the Proposed Development) such as Tarbert SSE to the east of site (at 5km) along the River Shannon could potentially impact the Proposed Development via the same mechanisms as described in the previous disaster scenario for the NORA Tank Farm.	There are several industrial sites located in the vicinity of the Proposed Development, including the upper tier COMAH site at Tarbert SSE. An incident at this facility such as a fire could result in significant damage at that location but would be unlikely to have an impact at the Proposed Development due to the separation distance of the sites (@5 km). The impact of thermal radiation and explosion overpressure generated by an event at Tarbert SSE would not be considered to have a sufficient magnitude at the Proposed Development, therefore it would be unlikely to cause significant harm to people or assets. Consequently, whilst this scenario would be considered a potential disaster at the Tarbert SSE, is not considered further for the Proposed Development. The QRA prepared for Land Use Planning (LUP) for the Proposed Development, which includes consequence modelling, demonstrates that a fire and explosion at the Proposed Development will not impact the Tarbert SSE site and cause a Domino Effect at the SSE assets.	N

Category	Description	Screening and Identification of Potential Major Accident / Disaster Hazard	Further Assessment Required (Y/ N)
'Domino Event' **Accident – Industrial accident at Moneypoint which escalates to the Proposed Development (and vice versa)**	An incident such as a fire occurring at a neighbouring industrial site (not associated with the Proposed Development) such as the Moneypoint ESB site on the northern bank of the River Shannon could potentially impact the Proposed Development via the same mechanisms as described in the first disaster scenario.	There are several industrial sites located in the vicinity of the Proposed Development, including the upper tier COMAH site at Moneypoint ESB. An incident at this facility such as a fire could result in significant damage at that location but would be unlikely to have an impact at the Proposed Development due to the separation distance of the sites (@3km). The impact of thermal radiation and explosion overpressure generated by an event at Moneypoint ESB would not be considered to have a sufficient magnitude at the Proposed Development, therefore it would be unlikely to cause significant harm to people or assets. Consequently, whilst this scenario would be considered a potential disaster at the Moneypoint ESB, is not considered further for the Proposed Development. The QRA prepared for Land Use Planning (LUP) for the Proposed Development, which includes consequence modelling, demonstrates that a fire and explosion at the Proposed Development will not impact the Moneypoint ESB site and cause a Domino Effect at the Moneypoint assets.	N
Structural Failure / Building Collapse during demolition / construction	An Incident such as a building collapsing during a demolition activity (e.g., falls in wrong direction or off schedule) or during construction. This could result in an event which has the potential to cause harm to people on Site, damage to property and assets.	Demolition / construction activities conducted at the Site will be subject to the CEMP, which will consider the potential for collapses to occur and identify appropriate mitigation measures and safe systems of work to be adopted to reduce the risk to a very low level. The risk of a disaster occurring is considered to be low and localised to site and is not considered further.	N

Category	Description	Screening and Identification of Potential Major Accident / Disaster Hazard	Further Assessment Required (Y/ N)
Accident - High Voltage (HV) Electrical equipment	Electrical power will be generated at high voltage levels at the Proposed Development. Accidental contact with high voltage systems can be immediately fatal to people and accidents involving electricity have occurred, particularly during construction activities, for example, where cranes have come into contact with overhead power lines. Malfunction of high voltage electrical systems can result in events such as arc flash incidents, which could create high levels of thermal radiation. People exposed to arc flash events can suffer fatal or life changing injuries. Damage to high voltage electrical infrastructure could restrict the ability of the facility to operate and compromise electrical supply to the local area.	There is the potential for a disaster to occur at the Proposed Development, which involves accidental damage or malfunction of high voltage electrical equipment. During construction, activities will be carried out to install new electrical connections including a connection to Eirgrid. This work will be very carefully controlled via the CEMP and specific work plans supported by risk assessments. Only suitably qualified and experienced electrical engineers will be allowed to work on high voltage systems, and industry standard safety procedures will be used. Engineers and technicians will manage this work to reduce the risk to a very low level. The risk of a disaster occurring is considered to be low and localised to site and is not considered further.	N
Accident - Vandalism / Arson / Terrorism / Cyber Attack	There is the potential for hostile acts against the Proposed Development, for example by people opposed to power generation using hydrocarbon fuels. In most instances, these acts would be limited to the potential interruption to operation, minor damage or vandalism. The potential for a significant terrorist incident would be considered as unlikely as the Proposed Development would not be considered as a high-risk target. Cyber security breaches, where electronic process control systems are remotely accessed for a variety of purposes, is an increasing threat, which the Power Generation industry is aware of and takes very seriously by putting systems in place to prevent such breaches. There is also the potential for accidental damage to be done to underground pipework should people not be aware of their presence	Vandalism, arson and terrorist activities could cause harm to people on Site, damage to assets and interruption to power generation operations at the Proposed Development. This will be mitigated by implementing security measures including appropriate fencing, closed-circuit television (CCTV), access control and guards etc. Cyber security systems are designed by expert engineers to prevent unauthorised access to computers on site, which provide essential functions for safe operation. Standard procedures include delineating areas where underground pipe works are present as well as routine walkovers to check for intruder intervention. The measures described above will reduce the risk associated with vandalism, arson, terrorism and / or cyber-attacks to a low level. Consequently, this scenario is not considered further.	N

Category	Description	Screening and Identification of Potential Major Accident / Disaster Hazard	Further Assessment Required (Y/ N)
Accident - Aircraft / Drone Strike	There is the potential for accidental damage to taller infrastructure due to aircrafts and drones passing over the Proposed Development. This could result in significant damage to infrastructure with the potential for subsequent fires and explosions from potentially released natural gas and distillate oil.	The nearest airport is Shannon, located approximately 50 km in an easterly direction. The flight path to and from this airport is to the north of the Proposed Development. Personnel vigilance and security systems are the key mitigation measures to prevent drones being used in the area of the Proposed Development. Therefore, the risk of a disaster occurring is considered to be low and is not considered further.	N
Climate Change / Natural Event – Surface Water Flooding	The frequency of storms experienced in the location of the Proposed Development could increase during the lifecycle of the facility as a result of climate change. This could result in flash flooding due to rainfall, pluvial flooding from surface water and fluvial flooding from rivers. Flooding could result in damage to site assets such as storage tanks and pipework, with the potential for subsequent loss of containment of distillate oil or other substances. There is also the potential for flooding to increase the buoyancy of the natural gas pipeline, such that the underground pipeline rises, causing structural damage to the pipework. There is the potential for fires and/ or explosion, if distillate oil releases were ignited, which could have an impact on and off-site.	A Site-Specific Flood Risk Assessment (FRA) Report has been prepared, refer to EIAR Volume 4 Appendix 6-3. The purpose of the FRA is to identify whether a potential risk of flooding exists at the Proposed Development, and if so, to what extent. The conclusion of the FRA is that there is a limited risk of fluvial flooding in the location of the Proposed Development. This conclusion will inform the engineering and environmental design of the Proposed Development, such as the installation of non-return valves on surface water drains and anchors along the 26 km pipeline. The design and installation of these systems will reduce the risk of an impact caused by flooding to a level which is considered to be ALARP. Consequently, whilst pluvial / fluvial flooding presents a credible risk to the Proposed Development, it will be mitigated by the Proposed Development design, to reduce the risk of a disaster and therefore this scenario is not considered further within this chapter.	N

Category	Description	Screening and Identification of Potential Major Accident / Disaster Hazard	Further Assessment Required (Y/ N)
Climate Change / Natural Event – Coastal Flooding	The frequency of storms experienced in the location of the Proposed Development could increase during the lifecycle of the facility as a result of climate change. This could result in storm surges from the Atlantic Ocean, and increased risk of coastal flooding. Coastal flooding could result in damage to site assets such as storage tanks and pipework, with the potential for subsequent loss of containment of distillate oil or other substances. There is also the potential for flooding to increase the buoyancy of the natural gas pipeline, such that the underground pipeline rises causing structural damage to the pipeline. There is the potential for fires and / or explosion if distillate oil releases were ignited, which could have an impact on and off-site.	A Site-Specific Flood Risk Assessment (FRA) Report has been prepared, refer to EIAR Volume 4 Appendix 6-3. The purpose of the FRA is to identify whether a potential risk of coastal flooding exists at the Proposed Development, and if so, to what extent. The conclusion of the FRA is that there is a risk of coastal flooding in the location of the Proposed Development. This conclusion will inform the engineering and environmental design of the Proposed Development, such as the installation of a concrete coastal flood defence wall. The design and installation of these systems will reduce the risk of an impact caused by coastal flooding to a level which is considered to be ALARP. Consequently, whilst flooding presents a credible risk to the Proposed Development, it will be mitigated by the Proposed Development design to reduce the risk of a disaster and therefore this scenario is not considered further within this chapter.	N
Climate Change / Natural Event – Increased Ambient Temperatures	The ambient temperatures experienced in the location of the Proposed Development could increase during the lifecycle of the facility as a result of climate change. Increasing atmospheric temperatures could potentially result in the operational instability of equipment such as cooling systems and electrical apparatus, such as switchgear, which is sensitive to temperature and humidity. Failure of these systems due to high temperatures could result in operational interruptions at the Proposed Development but would be unlikely to result in harm to people or the environment.	A potential increase in ambient temperatures has the potential to impact the operation and efficiency of the Proposed Development but would be unlikely to cause an incident which has the potential to result in a major accident or disaster. The engineering design of the facilities will take operation at future climatic conditions into account; therefore, this scenario is not considered further within this chapter.	N

Category	Description	Screening and Identification of Potential Major Accident / Disaster Hazard	Further Assessment Required (Y/ N)
Climate Change / Natural Event – Extreme Cold Weather Conditions	The weather conditions experienced in the location of the Proposed Development could drastically change during the lifecycle of the facility as a result of climate change. Extreme weather conditions such as ice storms can result in the freezing and subsequent damage of pipework within the Site. Failure of the pipework would result in operational interruptions at the Proposed Development and potentially the release of distillate oil to the environment. There is the potential for fires and/ or explosion if distillate oil releases were ignited, which could have an impact on and off-site.	A potential increase in ice storms has the potential to impact the operation and efficiency of the Proposed Development and has the potential to cause damage to assets and harm to people. The engineering design of the facilities, including de-icing equipment on the air intake structures, will take operation at future climatic conditions into account; therefore, this scenario is not considered further within this chapter.	N
Climate Change / Natural Event – Increased Wind Speeds	The wind speeds experienced during storms in the location of the Proposed Development could potentially increase during the lifecycle of the facility as a result of climate change. Increasing atmospheric wind speeds could cause tall structures, such as chimneys and exhaust vent stacks, to become unstable. In a worst-case event, these structures could collapse resulting in harm to people on site, damage to assets and an interruption to operation.	A potential increase in the maximum wind speeds, caused by climate change, has the potential to cause damage to assets and harm to people. The structural engineering design of the facilities will calculate wind loading and other requirements based on industry standard guidance and methods. Structural design standards incorporate factors to account for uncertainty, therefore operation at future conditions, which include higher wind speeds, will be considered. Consequently, a potential disaster involving high winds is not considered further within this chapter.	N
Natural Event – Earthquakes and seismic events	Low magnitude seismic events, which are not perceptible to humans, occur quite regularly throughout the island of Ireland. The probability for a major event with the potential to cause significant harm however is very low. If a major seismic event were to occur at the Proposed Development, there is the potential to cause harm to people, damage to assets and infrastructure and interrupt power generation operations.	The Irish National Seismic Network records earthquakes on the island of Ireland, however these are predominantly low magnitude events. For example, on 6th May 2010 a magnitude M2.9 earthquake occurred off the west coast of Ireland, approximately 50 km north of Ralappane. This event would not have been particularly noticeable on land. The structural engineering design of the facilities will calculate the appropriate loading requirements for seismic factors. Standard practice for monitoring of underground pipe works also include fitting them with seismometers and response signals to site in case alarms are triggered. This is considered to be suitable mitigation and therefore this scenario is not considered further.	N

Category	Description	Screening and Identification of Potential Major Accident / Disaster Hazard	Further Assessment Required (Y/ N)
Natural Event - Lightning strike	A direct lightning strike to the Proposed Development could cause damage to assets and equipment and has the potential to cause harm to people struck by falling objects. There is also the potential that lightning may ignite flammable substances. This could result in a fire causing damage to assets and potentially harm to people on Site.	The engineering design of the Proposed Development will incorporate lightning mitigation. This will be assessed in accordance with recognised industry standards such as EN/IEC 62305. An explosion risk assessment will also be carried out in accordance with ATEX Directive 1999/ 92/ EC (EC, 1999) which establishes the required standards to protect people, which will also consider the potential for lightning to be a source of ignition to flammable gases and vapours. It is expected that this assessment will specify the installation of an appropriate lightning arrestor to be fitted at the highest point on buildings such as the turbine building. The exhaust stack would also be expected to be fitted with lightning protection to safely conduct the electrical current to earth in the event of a storm. Consequently, these mitigation measures are considered to be sufficient to reduce risk and this scenario is not considered further.	N

14.8 Assessment of Major Accidents and Disasters

Identification of potential MAH / MATTE scenarios in this assessment has been based on the application of an industry standard qualitative risk assessment methodology, which considers the substances that could be present on the Proposed Development and their properties, including potential health, safety and environmental hazards.

The results of the accidents and disasters identification exercise has resulted in identifying potential MAH / MATTE scenarios for the Proposed Development, which are presented in **Table 14.3.** These represent 'worst-case' events which, although they have the potential for significant consequences, have a very low probability of occurrence.

A Quantitative Risk Assessment (QRA) will be carried out to support the COMAH reporting to the HSA for these potential MAH / MATTE scenarios and it will provide a detailed analysis of these hazards, including calculations of individual and societal risk.

A Quantitative Risk Assessment (QRA), including consequence modelling, was carried out for the Proposed Development in 2021 and updated in 2024, with regards to offsite impacts related to land use planning. This involved the impact assessment on offsite receptors of natural gas and diesel fuel fires and explosions, through pipeline and vessel storage losses. The QRA employed HSA guidance for credible release scenarios and the embedded data on frequency of loss and probability of ignition. The consequence modelling involved the use of proprietary modelling software (DNV SAFETI – version 8.9) to identify impact contours that are consistent with the three Land Use Planning (LUP) contours, used to assess developments relative to offsite receptors. The results showed that there were no incompatible land uses near the site for the three LUP zones and that the individual risk at nearby residential properties is negligible. There were no populated areas within any of the LUP risk curves and so the societal risk was not calculated but is considered negligible. No lethality is expected in populated areas near to the site.

Table 14.3: Assessment of Major Accidents

Scenario Ref.	Substance	Major Accident Scenario	Risks/ Effects	Prevention/ Mitigation Measures	Residual Effects
1	Natural Gas	Major fire / explosion at the Proposed Development Site including gas receiving and conditioning area, AGI and the Power Plant	A significant release of flammable gas at the onshore facilities could be caused by mechanical failure of equipment or impact damage such as a vehicle collision with exposed aboveground pipework. Immediate ignition of natural gas would result in a fire, delayed ignition could result in an explosion and / or fire. There is the potential for harm to people working at these facilities, however it is considered unlikely that a fire / explosion would have an impact offsite at residential areas or environmental receptors due to the distances involved. The gas pipeline is underground between the grid connection and the site.	Initial Consequence Analysis of the previous design of the Proposed Development concluded that a fire is a credible MAH scenario, however explosion overpressures were calculated to be negligible as a result of the open, unconfined areas of the onshore facilities. The design of the natural gas equipment and pipework will be to industry codes and standards to reduce the potential for a loss of containment, including the use of fully welded connections to avoid potential flanged leak sources. Pipework at the AGI will be predominantly routed below ground, further reducing the potential for a loss of containment. Pipeline safety systems and gas / liquid pressure regulation is to be installed along with operational controls and monitoring. Instrumentation and control systems will monitor the process and detect leaks. ATEX compliant equipment to be installed as required by Explosives Atmosphere Risk Assessment, to be carried out during the detailed engineering design of the Proposed Development. In the event of a major fire, damage to process equipment could occur, which may release potentially harmful materials such as fuel, lubrication or hydraulic oils, which would be contained within firewater runoff. A fuel interceptor will be installed within the drainage systems on the Proposed Development, which will contain any spilt oil or hydrocarbon material within drainage. This can then be collected and disposed of safely offsite. The onshore facility will be designed to contain firewater runoff within a retention area, which would prevent this material reaching unmade ground or other environmental receptors. Fire and gas detection and fire protection systems will be installed throughout the Proposed Development as appropriate, including passive and active fire suppression systems. The firewater system located onshore consists of storage tanks, emergency standalone diesel firewater pumps and a	Extensive and robust mitigation measures will be incorporated throughout the design of the Proposed Development to reduce the likelihood of an accidental release of natural gas. The residual low risk will be managed by inherent safe design, standard operating procedures, safety and environmental management measures to level commensurate with ALARP. The QRA for LUP shows that the consequences of this scenario are predominantly contained onsite. The individual risk at the nearest residential properties is negligible. There were no populated areas within any of the LUP risk curves and so the societal risk is considered negligible. No lethality is expected in populated areas near to the site.

Scenario Ref.	Substance	Major Accident Scenario	Risks/ Effects	Prevention/ Mitigation Measures	Residual Effects
				ring main with a diesel pump to maintain pressure within the ringmain. In the event of a major fire, products of combustion could be generated, therefore there is the potential for emissions to air (smoke etc.). However, natural gas is likely to achieve high levels of combustion, reducing the quantity of hydrocarbons and particulate matter which could be generated. Implementation of the preventative and mitigation measures as described above reduce the risk associated with this MAH scenario.	
2	Lithium and other metal ions / organic and chemical materials in BESS	Major Fire and / or Explosion at the BESS	A fire or explosion could occur at the BESS due to accidental damage to the systems or an operator error resulting in malfunction of the equipment (e.g., over charging, poor maintenance etc.). Ignition of the BESS system could result in a thermal runway and can result in an explosion with further knock-on effects to surrounding equipment at the Proposed Development.	The design of the BESS will be to current best practice to ensure that thermal runaway risks are minimised. This may include measures such as the introduction of insulation boards between cells within a battery container and additional cooling / suppression systems linked to sensors inside the enclosure to prevent fire from spreading between cells. The BESS containers may also have gaseous suppression systems to minimise the need for the application of water for cooling / fire-fighting. Cells will be appropriately spaced within the battery containers and the containers will also be evenly distributed across the dedicated BESS working area. A comprehensive fire detection and firefighting system will be provided for the Proposed Development as appropriate for the level of fire risk in each part of the Site. A fire protection design basis document, containing a fire risk assessment, will be developed by the appointed Contractor and this will inform the design of the firefighting systems, cell monitoring systems, fire and smoke detection systems etc. In the event of a power cut to the rest of equipment the control systems in place will automatically default to fail safe mode.	Extensive and robust mitigation measures will be incorporated throughout the design of the Proposed Development to reduce the likelihood of accidental damage to the BESS. The residual low risk will be managed by inherent safe design, standard operating procedures, safety and environmental management measures to level commensurate with ALARP.
3	Distillate Oil	Major Release to the Environment	A release of distillate oil from equipment or pipework could be caused by mechanical failure, impact damage or an operator error, resulting in a loss of containment.	The Proposed Development will include the following mitigation measures which will prevent and minimise the consequences of a release to the environment caused by the accidental loss of containment of distillate oil. - The design will be subject to numerous formal process safety studies to identify and mitigate	Extensive and robust mitigation measures will be incorporated throughout the design of the Proposed Development to reduce the likelihood of a release of Distillate Oil to the environment.

Scenario Ref.	Substance	Major Accident Scenario	Risks/ Effects	Prevention/ Mitigation Measures	Residual Effects
			The most likely impacts resulting from a major loss of containment of distillate oil are on the environment, should a catastrophic simultaneous failure of primary, secondary and tertiary containment measures occur. In such an event, distillate oil could enter soil, groundwater and the Shannon Estuary via local surface water drains. Distillate oil is toxic to aquatic life with long lasting effects, and as such a major release to the environment could cause death to the aquatic life in the Shannon Estuary.	hazards, such Hazard and Operability (HAZOP) studies. - Distillate oil will be stored in fixed steel tanks (primary containment) which are located within impermeable bunded areas with weather protection (secondary containment sized to contain greater than 110% of the largest tank volume or 25% of the total stored substances). The tanks and bunds will be subject to a formal risk-based inspection programme conducted by specialist accredited contractors. - The Proposed Development will have an attenuation system (tertiary containment), complete with class 1 hydrocarbon interceptors and measures to isolate the surface water to prevent discharge to the environment (also used for fire water containment). This will contain distillate oil in the event of a failure of primary and secondary containment. - During distillate oil offloading operations, protective systems will be in place to prevent a loss of containment such as dry-break hose couplings and vehicle chocks to prevent 'drive-away' incidents. - The design equipment and pipework will be to industry codes and standards to reduce the potential for a loss of containment, including the use of welded connections to avoid potential leak sources (flanges). - Fuel pipework safety systems such as cathodic protection will be installed along with operational controls and monitoring. - Instrumentation and control systems will continuously monitor the process and leaks causing a loss of pressure would be rapidly detected. - Alarms, both audible and visual, would be raised in the event of a deviation from set points such as pressure levels, vessel levels, etc. alerting site operators.	The residual low risk will be managed by inherent safe design, standard operating procedures, safety and environmental management measures to level commensurate with ALARP.

Scenario Ref.	Substance	Major Accident Scenario	Risks/ Effects	Prevention/ Mitigation Measures	Residual Effects
				- During commissioning, when distillate oil will be introduced to the site, detailed method statements, plans and assessments will be produced to carry out these activities safety. - The Proposed Development will be operated and managed by experienced, highly trained personnel in accordance with all Regulatory requirements, including COMAH. - A firewater retention pond is included in the Proposed Development and sized according to the EPA Guidance on Retention Requirements for Firewater Runoff (2019), as the most effective and suitable measure for retaining firewater. The retention pond will be rendered impermeable by use of an appropriate liner, and integrity-tested in line with the requirements of the Site's licence. All drainage will pass through the retention pond. An automatic shut-off valve linked to the site's fire detection system will be installed on the drainage outlet point. This tertiary system could be used for the containment of any distillate that is not contained by the secondary containment system.	
4	Distillate Oil	Major Fire and / or Explosion	A release of distillate oil could potentially arise from the same mechanisms previously described in risk event 3. Ignition of distillate oil could lead to a major fire. If initiated in one area of the Proposed Development this could have the potential to escalate to other areas. Ignition of distillate oil could also lead to an explosion, which could cause harm to people and assets such as equipment and buildings (pressure wave).	The mitigation measures which will prevent the accidental release of distillate oil have been laid out in the mitigation measures for risk event 3. To prevent and minimise the consequences of a major fire/explosion, the installed electrical and mechanical equipment will be compliant to ensure chances of ignition upon contact with distillate oil are minimized / eliminated. Equipment will be installed as required by an Explosives Atmosphere Risk Assessment, to be carried out during the detailed engineering design of the Proposed Development. A comprehensive fire detection and firefighting system will be provided for the Proposed Development as appropriate for the level of fire risk in each part of the Site. A fire protection design basis document, containing a fire risk assessment, will be developed by the appointed Contractor and this will inform the	The QRA for LUP shows that the consequences of this scenario are predominantly contained onsite. The individual risk at the nearest residential properties is negligible. There were no populated areas within any of the LUP risk curves and so the societal risk is considered negligible. No lethality is expected in populated areas near to the site. The residual low risk will be managed by inherent safe design, standard operating procedures, safety and environmental management measures to level commensurate with ALARP.

Scenario Ref.	Substance	Major Accident Scenario	Risks/ Effects	Prevention/ Mitigation Measures	Residual Effects
			The impact of a distillate oil fire and / or explosion could cause significant harm to personnel on Site, up to the potential for fatal injuries caused by thermal radiation and/or projected debris generated during an explosion. The distance to the nearest neighbours / residential receptors is such that an incident would be unlikely to have an impact offsite, other than potentially a recommendation by the emergency services to close windows and remain indoors temporarily.	design of the firefighting systems, the fire and smoke detection systems etc. In the event of a fire, or if distillate oil is detected within the CCGT enclosures, an alarm will be generated to alert operators. An inert gas (CO2) fire suppression and purging system will automatically operate to displace air from the enclosure and prevent or extinguish the fire. Fire safety evacuation drills and training is to be provided as appropriate. A firewater retention pond is included in the Proposed Development and sized according to the EPA Guidance on Retention Requirements for Firewater Runoff (2019), as the most effective and suitable measure for retaining firewater. The retention pond will be rendered impermeable by use of an appropriate liner, and integrity-tested in line with the requirements of the Site's licence. All drainage will pass through the retention pond. An automatic shut-off valve linked to the site's fire detection system will be installed on the drainage outlet point.	
5	Firewater	Major Release to the Environment of firewater containing toxic substances from BESS	In the event of a major fire and/or explosion at the BESS as described in risk event 2 firewater may be used to contain the fire and to mitigate thermal runaway, which may entrain toxic substances which could enter soil, groundwater and the Shannon Estuary via local surface water drains. The BESS could include substances such as heavy metal ions and fluoride, which are very toxic to aquatic life with long lasting effects, and as such a major release to the environment has the potential cause harm to the aquatic life in the Shannon Estuary.	BESS fire suppression systems will be designed according to best practice, which may involve the incorporation of gaseous fire suppression systems, as opposed to water-based systems, which have limited success with battery fires owing to their self-sustaining properties. Firefighting procedures may include controlled burn-out of the BESS to minimise the potential for contaminated firewater runoff. The onshore facility will be designed to contain firewater runoff within a retention area, which would prevent this material reaching unmade ground or other environmental receptors. A firewater retention pond is included in the Proposed Development and sized according to the EPA Guidance on Retention Requirements for Firewater Runoff (2019), as the most effective and suitable measure for retaining firewater. The retention pond will be rendered impermeable by use of an appropriate liner, and integrity-tested in line with the requirements of the Site's licence. All drainage will pass	The residual low risk will be managed by inherent safe design, standard operating procedures, safety and environmental management measures to level commensurate with ALARP.

Scenario Ref.	Substance	Major Accident Scenario	Risks/ Effects	Prevention/ Mitigation Measures	Residual Effects
				through the retention pond. An automatic shut-off valve linked to the site's fire detection system will be installed on the drainage outlet point. The firewater retention pond has been sized for all other plant operations, excluding the BESS. A firefighting strategy for the BESS will be developed so as to protect the integrity of the retention pond.	

14.9 Mitigation Measures

The following section contains a summary of the key measures which will be implemented to prevent major accidents and disasters at the Proposed Development.

- The CEMP (**Appendix A2.3**) will be updated by the Contractor in accordance with any conditions of planning, and similar plans developed for eventual demolition activities.
- The design, construction, and operation of the Proposed Development will be in accordance with international, national and established industry codes, standards and practice, such as the specification of pipework materials, design of structures etc.
- A detailed chemical inventory and risk assessments for all materials handled on-site will be produced in accordance with the requirements of the Chemical Agents legislation.
- All fuels and chemicals stored on-site will be subject to the Safety, Health and Welfare at Work (Chemical Agents) Regulations, as amended by *S.I. No. 231/2021* as well as compliance with the requirements of Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).
- The Proposed Development will comply with the requirements of all relevant health, safety and environmental legislation including COMAH, which requires operators to take all measures necessary to prevent major accidents and to ensure risks are minimised to ALARP.
- Regular maintenance and inspection of all facilities will be carried out to reduce the potential for equipment failures which could lead to a loss of containment, e.g. tanks will be on a formal inspection register.
- A firewater retention pond is included in the Proposed Development and sized according to the EPA *Guidance on Retention Requirements for Firewater Runoff (2019)*, as the most effective and suitable measure for retaining firewater. The retention pond will be rendered impermeable by use of an appropriate liner, and integrity-tested in line with the requirements of the Site's licence. All drainage will pass through the retention pond. An automatic shut-off valve linked to the site's fire detection system will be installed on the drainage outlet point. The firewater retention pond has been sized for all other plant operations, excluding the BESS. A firefighting strategy for the BESS will be developed so as to protect the integrity of the retention pond.
- Secondary fuel (distillate oil) will be stored with tertiary containment. Bunding and associated pipework will be designed in accordance with EPA Guidance Note on Storage and Transfer of Materials for Scheduled Activities. The secondary containment (primary bund) design will allow the greater of 110% of the largest tank within the bund or 25% of the total volume of substance within the bund, whichever is the larger. A second bund (tertiary containment) will be built around the primary bund and will contain any spillage should the primary bund fail or be over-topped by a spillage.
- The Environment Management System (EMS) for the Proposed Development will set out the requirements and procedures required to ensure that the Proposed Development is operating to appropriate standards. Such Procedures include:

- Hazardous and polluting liquids such as transformer oils will be stored in tanks located in bunds.
- Distillate Oil unloading bays will be designed to contain spillages.
- Storage tank level indicators and oil detection sensors in bunds will be provided with alarms.
- Class 1 hydrocarbon interceptors will be provided in the surface water drainage system.
- Measures to isolate the surface water drainage system will be provided to prevent discharge of contaminated water.

14.10 Emergency Management

A Site Emergency Response Plan (ERP) will be developed in relation to the Proposed Development in accordance with legislative requirements including COMAH and the IE licence, which will include a fire strategy and appropriate training procedures.

Procedures will be in place to clearly detail the responsibilities, actions and communication channels for operational staff and personnel on how to deal with emergencies should they occur. Staff will also receive the level of training required for their role and position. This will include dealing with events such as fires, spillages, flooding etc. Such measures will be included in the site operating and management system and regulated by the EPA through the IE licence.

The ERP will contain detailed plans for the response to emergencies such as loss of containment of Distillate oil, fires and severe weather events. A stock of emergency equipment such as spill kits will be maintained on Site in particular around the chemical storage areas.

The local Fire and Rescue Service and other key stakeholders will be consulted to provide an input to the development of emergency plans and potentially engage with desktop and live emergency training exercises.

The Emergency Response plans and systems are required as part of COMAH for the Site, to the satisfaction of the HSA.

14.11 Cumulative Impacts and Effects

Cumulative impacts or effects are defined as the addition of many minor or insignificant effects, including other projects, to create larger more significant effects. The purpose of the MA&Ds assessment is to determine significant credible major accident or disaster scenarios for the Proposed Development, taking into consideration the multiple, cumulative failures which would have to happen, as a single isolated failure would not result in a major accident. The impact assessment, which has been carried out for the Proposed Development, as detailed in **Section 14.5** takes into consideration these multiple, cumulative failures, an example of which is described below.

For a major fire to occur, a mechanical system such as an item of process equipment or a section of pipe would be required to fail, releasing flammable gas. For this failure to occur, a metal or weld defect would be required to be created and undetected during the manufacturing and installation process. Once installed, testing and routine visual inspection would have to fail to identify the presence of this

defect, which over time could deteriorate via mechanisms such as fatigue caused by pressure cycling, until a catastrophic failure occurs. This results in a release of flammable gas, which ignites in contact with a source of ignition such as non-ATEX compliant electrical systems, resulting in a fire.

Other failure mechanisms and sources of ignition exist which could result in a loss of containment and a subsequent fire. These include for example instrumentation, operational and human factors related failures.

There are multiple layers of prevention and mitigation measures in place for the Proposed Development, to prevent major accidents such as the fire scenario described above from occurring, which are described in **Section 14.8**. These include, for example, the emergency shutdown system which can be initiated by a number of systems including automatic fire and gas detection and manual activation.

Inherent safety principals have been adopted in the Proposed Development, principally reduction of the quantities of flammable materials present onshore and the location of systems / equipment.

Facilities such as the Power Plant and major electrical equipment to be installed as part of this Proposed Development will be designed to incorporate a separation distance, to prevent major accidents such as fires and explosions originating in one area from spreading to another area or escalating via domino effects. This separation distance is based on established engineering guidance for industrial site layout.

Inherent safe design measures to prevent defects include mechanical design codes for equipment and pipework, and quality assurance testing prior to installation using techniques such as x-ray examination and dye penetration. Once installed, regular inspection as required by Statutory Regulations will be carried out to identify defects. The equipment and pipework will be fitted with instrumentation to monitor the pressure and flowrate of gas, alerting operators to deviations from set points, preventing fatigue. If a failure was to occur even after all these design and operating measures were in place, mitigation measures to prevent ignition of gas include measures like the specification of installed ATEX compliant mechanical and electrical equipment. Process Safety ATEX specialists will be involved at all stages of the Proposed Development to assure compliance with these Directives and providing input to the layout of the facilities.

Cumulative effects also require the consideration of other projects and developments at the Site and in the surrounding area, which include potential new facilities, e.g., an LNG terminal at the site[1], as well as existing industrial infrastructure nearby; such as the Tarbert and Moneypoint power plants, scheduled for refurbishment, as described in **Section 14.4.2**.

The Proposed Development is a Lower tier COMAH site, based on gas fired plant, with backup distillate oil fuel. Any further developments at the Site, such as the introduction of an LNG Terminal will also be required by law to take 'all measures necessary' to prevent major accidents, such as those set out in **Table 14.3**.The introduction of new facilities at the Proposed Development or in the locality of the Proposed Development or changes to nearby establishments that could influence the site will fall under a robust Management of Change (MoC) regime, which is part of the SMS under COMAH. This will

[1] ABP Ref No. ABP-311233-21 – Application for a 10-year permission for a Strategic Infrastructure Development (SID) comprising a power plant, battery energy storage system, regasification unit, jetty and onshore receiving facilities, and an AGI, which was refused by the Board on 15th September 2023, and is currently subject to Judicial Review proceedings.

ensure that the appropriate actions and remedial measures are implemented so that 'all measures necessary' are undertaken to prevent major accidents.

The Tarbert and Moneypoint facilities are located at a distance which, should a major accident such as a fire or explosion occur, would not have an effect on the Proposed Development. The location of current planning applications will be considered collectively to ensure that these are at appropriate location, such that they would not have the potential to initiate or escalate major accidents or disasters at the Proposed Development.

The risk of cumulative effects leading to potential MA&D at the Proposed Development is therefore considered to be **low** and detailed safety studies and QRA will be prepared / updated as the detailed design of the Proposed Development progresses, to identify where risks can be further reduced.

14.12 Residual Impacts and Effects

Residual effects are defined as those impacts that remain following the implementation of mitigation measures. As per the EPA draft guidelines, the effects from the residual impacts that remain after all assessment and mitigation are referred to as 'Residual Effects' (EPA, 2022). This assessment of MA&Ds has identified the potential for major hazards to occur at sensitive environmental receptors, such as a fire caused by damage or failure of systems containing gas. These events have significant consequences; however, the likelihood will be extremely low due to measures such as the engineering design of assets and protective systems.

Hazardous events such as these have been demonstrated to be extremely unlikely, however the risk cannot be entirely eliminated, and therefore will be reduced to ALARP, as required under COMAH. Further analysis of mitigation measures and residual effects will be undertaken as the detailed design of the Proposed Development progresses.

14.13 Summary

The assessment has reviewed the potential MA&D scenarios applicable to the Proposed Development, associated with the substances present and the operation of the Proposed Development. The most likely scenarios which could occur at the Proposed Development that could result in an impact representing a major accident and / or disaster are:

- A loss of containment and subsequent fire and/or explosion caused by accidental damage or failure of the pipework and equipment containing Natural Gas (Risk Event 1).
- Fire and/or explosion caused by accidental damage or failure of the BESS (Risk Event 2).
- A loss of containment and subsequent release to the environment caused by accidental damage or failure of the pipework and equipment containing Distillate Oil (Risk Event 3).
- A loss of containment and subsequent fire and/or explosion caused by accidental damage or failure of the pipework and equipment containing Distillate Oil (Risk Event 4). This event also includes firewater impacts.
- A loss of containment and subsequent release to the environment of Firewater used to extinguish the BESS (Risk Event 5).

These incidents have an extremely low probability of occurrence but have the potential for effects on people and the environment.

A QRA has been undertaken for Land Use Planning (LUP) for individual and societal risk, associated with natural gas and distillate fuel loss of containment and fires / explosions. The QRA concludes that:

- There are no land uses in the surrounding area of the Proposed Development that are against the land use planning criteria, for example residential housing.
- The individual risk at the nearest residential receptors is negligible.
- There were no populated areas within any of the LUP risk curves and so the societal risk was not calculated but is considered negligible.
- No lethality is expected in populated areas near to the site for members of the public.

Similar facilities have been in operation for many years across the world and the power generation has a very good safety record.

The engineering design of the Proposed Development will incorporate all of the appropriate standards and mitigation measures necessary to reduce the risks of accidents and disasters to an acceptable level, *i.e*. ALARP.

It is not possible to completely eliminate the risks associated with the use of materials such as Distillate Oil. Consequently, the Site will comply with all applicable safety legislation, national and international design standards, industry guidance and other control measures, including those set out in **Table 14.3**, which will be adopted at the Proposed Development.

Overall the construction, operation and decommissioning of the Proposed Development is considered **'Not Significant**' for Major Accidents and Disasters as all risk events will be mitigated to a level commensurate with ALARP.

14.14 References

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