

17 Major Accidents & Disasters

17.1 Introduction

The purpose of this chapter of the EIAR is to assess the vulnerability of the Proposed Development to major accidents and disasters (natural and man-made) and to demonstrate how that vulnerability is to be managed to prevent or reduce potential significant adverse effects to human health and the environment. The revised EIA Directive 2014/52/EU states the need to assess:

“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”

The potential effects posed by the construction and operational phases of the Proposed Development are investigated, and suitable mitigation measures are recommended to minimise effects on local sensitive receptors. The assessment also considers the possibility for ‘domino’ effects to occur i.e. where a major incident at the Proposed Development could cause an event at another nearby site.

The Proposed Development consists of an Anaerobic Digestion Facility, which will comprise various structures and plant equipment including digester tanks and other feedstock and digestate storage tanks, gas processing equipment such as a combustion engine and biogas upgrader, CO₂ liquefaction. A detailed description of the Proposed Development is contained in **Chapter 2 - Project Description**. The site is located in the townlands Corracunna, Coolnanave and Garrane, Mitchelstown, Co. Cork.

The facilities associated with the Proposed Development will generate and utilise dangerous substances as classified under the Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the “COMAH Regulations”), namely biomethane, biogas, propane and diesel. An inventory of the proposed quantities of dangerous substances was carried out in order to ascertain whether the Proposed Development would be subject to the COMAH Regulations.

Applying the aggregate calculation method outlined in the Seveso III/COMAH Directive, the Proposed Development, when operating at full capacity i.e. assuming biogas in the digester headspaces, biomethane in pipework, LPG gas and diesel for fuelling machinery, remains below the lower-tier threshold for which the COMAH regulations would apply. **In summary, the Proposed Development will not have quantities of dangerous substances on site that would bring the site under Seveso/COMAH regulations and as such is not a COMAH site.** This conclusion has been confirmed as appropriate through correspondence with the Health and Safety Authority (HSA) inspectorate.

In accordance with planning and legislative requirements the Proposed Development has been designed in line with best available technology (BAT) and industry best practice. Mitigation against the risk of accidents/injuries has been embedded through the design process. Detailed hazard and risk analyses has been and will continue to be carried out throughout the project development lifecycle, including formal process safety risk assessments such as Hazard Identification (HAZID), Hazard and Operability (HAZOP) and Hazardous Area Classification (HAC) for Explosive Atmospheres, at the appropriate project/ design stage(s).

The objectives of this chapter are:

- To provide a baseline assessment of the receiving environment in terms of existing natural hazards and potential accident hazards e.g. proximity of other hazardous sites, and sensitive infrastructure.
- To identify any potential negative effects during the construction and operational phases of the Proposed Development.
- To propose suitable mitigation measures to prevent or reduce the significance of the negative effects identified.
- To consider any significant residual effects or cumulative effects posed by the Proposed Development.

17.2 Legislation, Planning Policy and Guidance

ORS have been commissioned to assess the potential impacts of the Proposed Development in terms of major accidents and disasters during the construction and operational phases.

The principal members of the ORS EIA team involved in this assessment include:

- **Project Scientist & Lead Author:**
Sarah Bergin - B.Sc. (Chemistry), PhD. (Engineering),
Current Role: Senior Environmental Consultant. Experience ca. 14 years.
- **Project Scientist and Reviewer:**
Luke Martin – B.A. (MOD) (Natural Sciences), M.Sc. (Sustainable Energy and Green Technology), CEnv, MIEEnvSc. Current Role: Chartered Environmental Consultant.
Experience ca. 12 years.
- **Project Coordinator & Reviewer:**
Oisín Doherty – B.Sc. (Geography with Environmental Science), MSc. (Environmental Management), CEnv, MIEEnvSc. Current Role: Senior Environmental Consultant.
Experience ca. 16 years.

Consultation between ORS, the client, and other members of the planning/design team was made in order to obtain information required to assess the potential construction and operational phase impacts on local hydrology and hydrogeology.

This assessment was carried out in accordance with the following guidance documents:

- EPA, (2022). *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*.
- HSA, (2023). *Guidance on Technical land-use planning advice*
- Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the “COMAH Regulations”)
- DEHLG (2006). *A Framework for Major Emergency Management*
- Committee for the Prevention of Disasters (CPD). *Guidelines for Quantitative Risk Assessment “Purple Book”* CPR 18E. The Hague: CPD, 1999. 240 pp
- IEMA (2020) *‘Major Accidents and Disasters in EIA: A Primer’*
- CER (2017) *ALARP Guidance - Part of the Petroleum Safety Framework & the Gas Safety Regulatory Framework* (CER/16/106)
- BS 18004-2008: *Guide to achieving effective occupational health and safety performance*

- Gyenes., Wood M-H., Struckl M., *Handbook of Scenarios for Assessing Major Chemical Accident Risks*, EUR 28518 EN, doi:10.2760/884152
- BCGA (2020). Guidance note 41: Separation distances in the gases industry

17.3 Assessment Methodology & Significance Criteria

17.3.1 Definitions

For the purposes of this assessment, the definition of a major accident is taken from the Gas Safety Framework and Petroleum Safety Framework, which defines it to be:

“An event, such as a major emission, fire, explosion, impact or structural failure resulting from uncontrolled developments that could lead to a serious danger to human health whether immediate or delayed. Serious danger implies events which could impact multiple persons, including members of the public and/or workforce”

A disaster is a man-made/external hazard (such as an aircraft crash) or a natural hazard (such as an earthquake or flooding) with the potential to cause an event or situation that meets the definition of a major accident.

17.3.2 Assessment approach

This assessment has applied the “as low as reasonably practicable” (ALARP) principle, which is further described in the CER/16/106 “ALARP Guidance: Part of the Petroleum Safety Framework and the Gas Safety Regulatory Framework” guidance document.

“The fundamental principle of risk-based hazard management is that whilst risks cannot always be completely eliminated, it should be possible to reduce them to a level that is ALARP, so that they are tolerable to society because all reasonably practicable risk reduction measures have been implemented. The management of hazards, such that the risks to safety are ALARP, must be demonstrated, and in industries where there is a possibility of a Major Accident, the mechanism for such a demonstration is through a safety case.”

As part of the ALARP assessment, a risk management process (also termed hazard management process) must be followed that incorporates the ALARP principle. The steps utilised in this process are outlined in the following subsections.

The assessment took a staged approach:

- **Establishing the context/identification of receptors:** Relevant data was collected, including meteorological and seismic mapping for the area. Other EIAR chapters were consulted to establish the relevant receptors close to the site. Relevant HAZOP documentation was accessed in order to understand design safeguards being implemented.
- **Hazard identification:** Potential hazardous scenarios for both construction phase and operational phase were identified. This was achieved through multiple team meetings, including formal hazard identification and analysis workshops with competent persons with knowledge of the particular site, project and/or activities to be undertaken. Furthermore, incident databases for historical accident data, such as the EA database in the UK, as well as safety guidance documentation from countries with an established biogas sector, including Germany and Austria were consulted to inform on biogas specific hazards.

- **Major Accident Hazard Screening:** A scoping exercise was carried out where each hazardous scenario was assessed to determine the severity of impact to people and the environment if it did occur. In this way scenarios were scoped in or out as events that could result in a major accident and/or disaster, as defined in the opening paragraph of this section. Major accident/disaster events are typically those with low likelihood of occurrence but of high consequence should they occur. Note: the scoping exercise considered the severity in the event of no risk control measures being in place.
- **Residual Risk Determination:** For the scenarios scoped in as having the potential to result in a major accident, a cumulative risk assessment was carried out that considered the likelihood of occurrence following implementation of the proposed risk reduction measures e.g. designed in safeguards.

Identification Of Receptors

Receptors considered in this assessment include:

- Human health (on-site)
- Human health (off-site) population and members of the public, local communities
- Environmental biodiversity, with particular attention to species and habitats protected under The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations) (transposing the EU Council Directives on Birds and Habitats (Council Directive 92/43/EEC))
- Environmental hydrology considering groundwater
- Environmental hydrology considering surface waters: in particular considering the Funshion river, and local boreholes
- Environmental land considering soils, bedrock geology
- Environmental air considering biological, gas emissions and impact to habitats, species
- Infrastructure considering property and material assets,
- Infrastructure considering cultural heritage, archaeological sites and the landscape.

Major Accident Scenarios

A number of potential major accident scenarios were considered i.e. potential unplanned events or situations, relevant to the Proposed Development, with a potential to result in significant adverse effects.

The scenarios were grouped into the following risk events.

- fire/ explosion and risk of release of harmful gas,
- spillage/ leak of chemicals or pollutants into groundwater/ surface water,
- extreme weather (e.g. flooding, lightning),
- vandalism/trespass/terrorism,
- ground collapse,
- major road traffic accident,
- release of asbestos (during construction phase i.e. demolition works),
- aircraft/ drone impact,
- domino effects from impacts at neighbouring facilities and/or critical civil infrastructure.

Assessment Criteria

Likelihood assessment: The ranking takes account of any relevant prevention or mitigation measures in place when assessing the likelihood of the event occurring i.e. good practice measures. A four-point scale was used, ranging from Negligible likelihood to Probable likelihood. This scale considers the likelihood in terms of frequency of occurrence, based on historical incident data, industrial failure frequencies of equipment, and codes and standards. The likelihood scale also considers the proposed safety controls put in place e.g. the hierarchy of the controls, such as engineering safeguards and procedural measures and the aggregation of these “safety barriers” applied for each event. The scale classifications and corresponding likelihood metrics are shown in **Table 17.1**.

Table 17.1: Likelihood of occurrence, assessed taking account of typical frequencies of occurrence (F) in industry per annum (pa), and extent of proposed mitigation measures.

Ranking	Classification	Likelihood
1	Negligible	$F < 10^{-5}$ pa; foreseeable but requires 3 or more controls to fail or be circumvented for this to happen
2	Remote	$10^{-5} < F < 10^{-3}$ pa; at least 2 controls need to fail or be circumvented for this to happen
3	Possible	$10^{-3} < F < 10^{-1}$ pa; at least 1 control needs to fail or be circumvented for this to happen. This or a similar control system has failed or been circumvented previously but not lead to an incident
4	Probable	$10^{-1} < F < 1$ pa; the same or similar control system has failed previously and resulted in an incident (or there are no controls in place).

Impact analysis: The consequences of the scenarios were considered, expressed in terms of a negative impact on human welfare (both on-site and off-site), damage to the environment or physical infrastructure or other subsequent consequences. Historical accident data, industry specific studies and guidance documentation for the biogas industry were considered during this assessment. A five-point scale was used, ranging from Negligible impact to Catastrophic, considering likely required clean-up effort and ongoing effects to human receptors, as quantified in guidance and standards for major emergency management produced by Department of the Environment, Heritage & Local Government, and ISO standards relating to Occupational Health and Safety management. The scale classifications and corresponding impact metrics are shown in **Table 17.2**.

Table 17.2: Severity of impact, assessed taking into account the negative impact on human welfare (both on-site and off-site), damage to the environment or physical infrastructure or other subsequent consequences

Ranking	Classification	Health and Safety		Environmental
		On-site	Off-site	
1	Negligible	Event resulting in very minor or no injury to individuals. No clinical intervention required	None	None
2	Minor	Injury or health effect requiring minor clinical treatment and/or resulting in a person being unable to perform their normal work role for up to 3 days	No injury to individuals, minor disruption, minor localised disruption to community services or infrastructure (<2hrs)	No contamination, localised effects

3	Significant	Injury or health effect that prevents a person from undertaking their normal work role for more than 3 days. Significant clinical intervention required	Localised discomfort e.g. irritation or temporary displacement	Simple contamination, localised, short-term duration
4	Serious	Fatality or major injury (prolonged absence from work or significant medium-/long-term impact on health)	Minor injuries, acute, short-term exposure, displacement for 6-24hrs, or beyond	Significant contamination, short term duration or minor long-term requiring clean-up action
5	Catastrophic	Multiple fatalities	Major injuries or fatalities	Heavy contamination, widespread effects of extended duration.

Cumulative Risk assessment: Combining the scales for likelihood of occurrence and severity of impact as shown in **Table 17.1** and **Table 17.2** above, a risk matrix was created, **Table 17.3** below, that presents the outcome of the risk assessment i.e. the cumulative risk, for each event in terms of an acceptability criteria, namely “Broadly Acceptable”, “Acceptable”, “Tolerable if ALARP” and “Intolerable”.

Table 17.3: Risk Matrix – combination of the likelihood of occurrence with severity impact to ascertain cumulative risk of the scenario being assessed.

Cumulative Risk		Impact				
		1 Negligible	2 Minor	3 Significant	4 Serious	5 Catastrophic
Likelihood	1 Negligible	1 - Broadly acceptable	2 - Broadly acceptable	3 - Broadly acceptable	4 - Broadly acceptable	5 - Acceptable
	2 Remote	2 - Broadly acceptable	4 - Broadly acceptable	6 - Acceptable	8 - Tolerable if ALARP	10 - Intolerable
	3 Possible	3 - Broadly acceptable	6 - Acceptable	9 - Tolerable if ALARP	12 - Intolerable	15 - Intolerable
	4 Probable	4 - Broadly acceptable	8 - Tolerable if ALARP	12 - Intolerable	16 - Intolerable	20 - Intolerable

The significance of the risk ratings in terms of required actions are:

Broadly acceptable/acceptable (risk scores 1-6) – no further action required.

Tolerable if “as low as reasonably practicable” (ALARP) (risk scores 8-9) – no further action required now but carry out regular review (annual at least) to assess if measures continue to be “reasonably practicable” e.g. have incidences occurred onsite, have other BAT methodologies become available. Ensure safety controls are maintained e.g. regular equipment/process inspection, training of staff, and planned preventative maintenance.

Intolerable (risk scores 10-20) – STOP work, you **MUST** put additional measures in place to reduce risk, do not commence activity until this is done

17.4 Baseline scenario/Description of the Receiving Environment

This section describes baseline environmental characteristics within the Proposed Development locality. These include:

- a description of potential natural hazards which may impact the Proposed Development Site, including flooding, meteorological hazards and geological hazards
- existing major accident hazard sources that may impact the Proposed Development Site such as COMAH sites or civil/utilities infrastructure
- sensitive environmental receptors, including habitats, watercourses and bedrock geology
- other hazards that have been screened out of the assessment.

Note: some baseline information has already been described in other EIAR chapters or technical reports i.e. flood risk, biodiversity, hydrology, and so outcomes relating to these are summarised here.

The sources from which the baseline information has been derived are mentioned in the various subsections and include meteorological data from Met Eireann, Lightning data from the ATDNet network, as well as information described in the other Environmental Chapters.

17.4.1 Assumptions and Limitations

- Environmental impacts that do not meet the definition for a major accident and disaster e.g. minor spills, typical operational noise are addressed in the other Environmental Chapters.
- This assessment is based on the proposed technical design of the Proposed Development and early appraisal of potential hazards that will be refined and reappraised as the project develops e.g. through further HAZOP, requirements from EPA licensing, consultation with HSA.
- A semi-quantitative approach was taken where a scoring system was derived to evaluate the severity and likelihood of risks, providing a more structured and nuanced analysis compared to purely qualitative or purely quantitative methods. The assessment utilised codes and standards, biogas sector incident data and guidance, and site-specific hazard assessments to devise the scoring system.
- Good safety management principles will be applied during construction and operation and all risks that have the potential to be major accidents or disasters, and that could impact a local environmental receptor, will be managed using the ALARP principle.
- Detailed design of the Proposed Development and operation of the facility will adhere to industry standards and codes, many of which are mandatory. Industry standards require infrastructure and systems to be designed in order that risks to people and the environment are either eliminated or reduced to levels that are ALARP.
- Emergency services, including the local fire officer, will conduct site visits to familiarise themselves with the layout and design of the Proposed Development. This will ensure that appropriate emergency response actions can be taken in the event of an accident, to minimise the potential harm. The assessment criteria applied has considered the DoEHLG Framework for Emergency Management

17.4.2 Natural Hazards

17.4.2.1 Weather Events

Hazards resulting from severe weather events which could impact the Proposed Development

include heavy rainfall, storms and gales, extreme temperatures, cold and snow, and thunderstorms. Met Eireann describes Irelands climate as follows:

“The dominant influence on Ireland’s climate is the Atlantic Ocean. Consequently, Ireland does not suffer from the extremes of temperature experienced by many other countries at similar latitude. The hills and mountains, many of which are near the coasts, provide shelter from strong winds and from the direct oceanic influence. Winters tend to be cool and windy, while summers, when the depression track is further north and depressions less deep, are mostly mild and less windy”

For this section, the climate baseline environment was considered in two parts, present day (averaged over the period 1991-2020) and future projections (modelled from global climate models and extrapolated for the period 2041-2060). The information was compiled using desk-based reviews from Met Eireann Observation Network data and EPA commissioned research publications.

The present-day baseline, defined as the average climate over the 30-year time period 1991-2020, references the Met Éireann climate averages models. In order to provide a more specific present-day climate baseline within the study area, the baseline values presented here are from the Cork Airport Observation station. Where data is not available, national values i.e. values averaged over all meteorological monitoring stations, are used. It was noted during the desktop review that the meteorological averages in Cork airport are similar to that of the national averages.

The present-day baseline is presented in **Table 17.4**. Winter is defined as the average values for the months of December - February (inclusive) and summer is defined as the average values for the months of June - August (inclusive).

Table 17.4: Present-day climate baseline for the Cork area (based on measured values averaged over the period 1991-2020)

Climate variable	Baseline value
Average seasonal maximum air temperature (summer)	18°C
Average seasonal minimum air temperature (winter)	3.4°C
Average seasonal mean temperature (summer)	14.6°C
Average seasonal mean temperature (winter)	5.9°C
Average Precipitation rate (mm) (summer)	265.1mm /season
Average Precipitation rate (mm) (winter)	365.1mm /season
High winds (max. mean gust experienced)	80 knots (41m/s) (in Dec)
Average mean no. of days with gales	5.1 days (predominantly winter months)
Average mean windspeed	9.8 knots (5.04m/s)
Snow and Ice	The average number of days with snow or icfall each year is 9.5. The average number of days with snow settling is 1.8.
Thunder	The average number of days with thunder each year is 3.2.
Sunshine and solar gain	The mean daily duration over the year is given as 4hrs per day

Regarding the future baseline, the EPA commissioned a study in which regional climate models (RCMs) were developed using the outputs from global climate models (GCMs) to produce more refined projections of the potential local and regional impacts of climate change. The models were first validated using known climate data from 1981–2000. The models were then used to derive climate projections for the time period 2041-2060.

A number of climate change scenarios were modelled, termed Representative Concentration Pathways (RCP); the scenarios relate to the expected resultant CO₂ concentrations in the event of mitigation strategies vs. no action taken. The two scenarios are RCP 4.5, the intermediate scenario i.e. that carbon dioxide (CO₂) emissions start declining by approximately 2045, and RCP 8.5, the worst-case scenario i.e. no actions are taken, and emissions continue to rise throughout the 21st century were used. Both future baseline scenarios are listed here and represent the projections nationally.

An overall summary for climate change trends for Ireland (under both scenarios modelled) is hotter days and colder nights, with summer daytime and winter nighttime temperatures projected to increase and decrease respectively, by 1–2.4°C. Substantial decreases of approximately 50% are projected in the number of frost and ice days and precipitation is expected to become more variable, with increases in the occurrence of both dry periods and heavy precipitation events

The projected probabilistic changes in key average climate variables under RCP 4.5 and RCP 8.5 emissions scenario from the time period 1981-2000 to 2041-2060 are summarised in **Table 17.5**, for the time period 2041-2060.

Table 17.5: Projected probabilistic changes in key average climate variables under RCP 4.5 and RCP 8.5 emissions scenario from the time period 1981-2000 to 2041-2060

Climate Variable Projected	RCP4.5 scenario (2041-2060)	RCP8.5 scenario (2041-2060)
Mean annual temperature (increase)	+1–1.2°C	+1.3–1.6°C (largest increases in the east)
Average annual snowfall	- 52%	-63%
Mean annual percentage change 10-m wind speed	-1.8%	-2.6%
Number of heatwave events (periods of more than 3 consecutive days exceeding the 99th percentile of the daily maximum temperature of the May-to-September season of the control period)	+1 to 8	+3 to 15
Number of frost days (days when the minimum temperature is < 0°C)	- 45%	-58%
Number of ice days (days when the maximum temperature is < 0°C)	- 68%	-78%
Annual average no. of “wet days” (defined as one on which the daily precipitation amount is greater than 20 mm)	+10%	+14%
Annual average no. of “very wet days” (one on which the daily precipitation is greater than 30 mm)	+21%	+31%

17.4.2.2 Flood Risk

A flood risk assessment was carried out and is reported in more detail within the **Flood Risk Assessment** technical report and **Chapter 8 – Hydrology and Hydrogeology**. The

conclusions are summarised here.

According to the Office of Public Works (OPW), the main sources of flooding are rainfall (inland flooding) or higher sea levels (coastal flooding). Coastal flooding is not relevant here due to the distance from the coast i.e. >40km away. Regarding flooding from rainfall, the National Indicative Fluvial Maps (NIFM) fluvial flood extents for the Present-Day scenario show potential flooding approximately 1 km southwest and 1.3 km north of the site, with no significant extension of these floods towards the site in the mid-range and high-end future scenarios. Additionally, the Geological Survey Ireland groundwater mapping identified no groundwater flood extents, from low to high probabilities, within a 15 km radius of the site. A summary of the above-noted flood risk data as derived from the OPW map viewer within the vicinity of the site is presented in **Figure 17.1**.

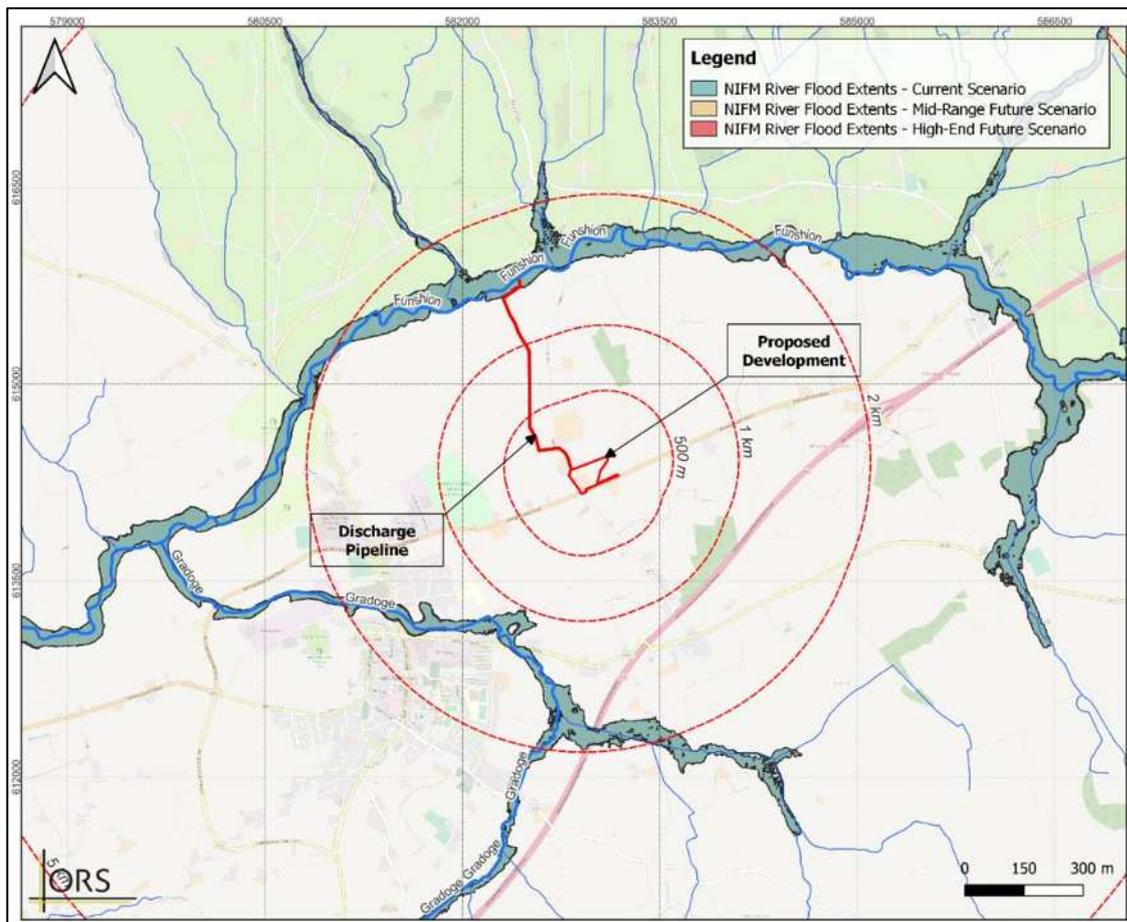


Figure 17.1: Illustration of the noted flood risk data as derived from the OPW map viewer within the vicinity of the site.

Based on this assessment, the site is classified as Flood Zone C i.e. the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). This aligns with the findings in the Strategic Flood Risk Assessment part of the Cork County Development Plan (2022-2028), indicating that no specific flood risk mitigation measures are required for this site.

17.4.2.3 Lightning

Valentia Observatory has lightning detection antenna which form part of an international

network administrated by the UK Met Office i.e. the ATDNet, an operational lightning detection network. The ATDnet Lightning Detection System is optimised for detecting cloud-to-ground lightning strikes and flashes rather than cloud lightning (inter-cloud and intra-cloud lightning). The majority of lightning occurs in the storm cloud itself or between clouds. On average approximately 10 to 20 percent of all lightning over Ireland are cloud-to-ground strikes. Typical location accuracy is estimated to be around 1–3km, or less.

Looking at compiled data, Ireland as a whole, experiences a relatively low frequency of thunderstorm events compared to mainland Europe. The ATDnet average annual lightning flash density (FD) over Ireland is between 0.03 and 0.12 FD, and is considerably lower than most of England, which sees between 0.12 and 0.75 FD¹. The vast majority of lightning activity is shown to occur in the summer season with much lower activity in spring and autumn, and virtually none is visible on the winter FD maps.

In 2018, the Met Office UK produced a lightning flash climatology for Europe using a decade of data as obtained from the ATDnet long-range lightning detection network in order to understand average annual lightning flash densities in Europe. The results are illustrated in **Figure 17.2**.

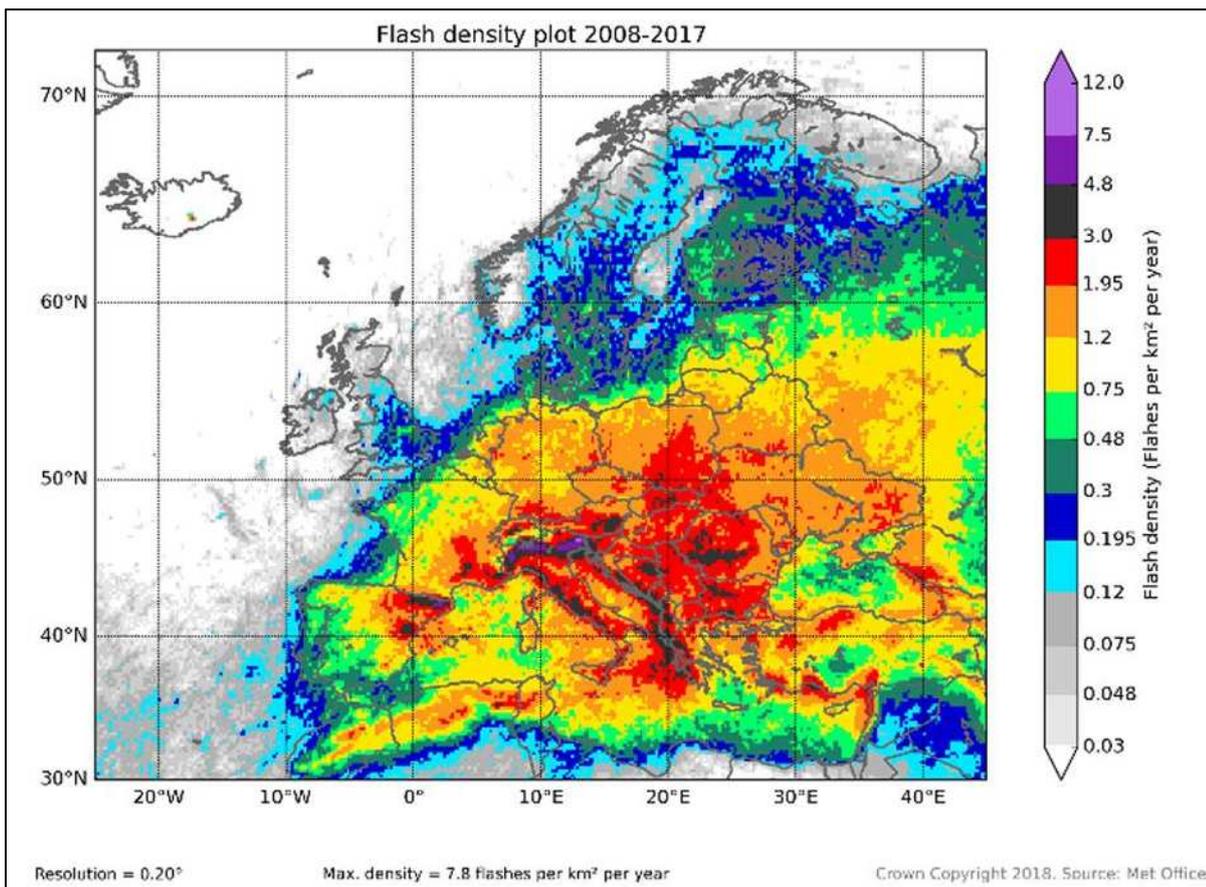


Figure 17.2: Average annual ATDnet lightning flash density in Europe during 2008–2017 (as produced by the Met Office, UK²). Includes data from Valentia Observatory.

1. Source: Hayward, Leah & Whitworth, Malcolm & Pepin, Nick & Dorling, Steve. (2022). A regional lightning climatology of the UK and Ireland and sensitivity to alternative detection networks. *International Journal of Climatology*. 42. 10.1002/joc.7680.

2. Source: Sven-Erik Enno, Jacqueline Sugier, Regina Alber, Mark Seltzer, (2020) Lightning flash density in Europe on the basis of 10 years of ATDnet data. *Atmospheric Research*, Volume 235

17.4.2.4 Seismic Activity

Ireland is not in a particularly tectonically active area of the world. **Figure 17.3** overleaf is a map derived from data collated by the US Geological Survey showing the record of seismic incidents in Europe from 1925 to 2025, where the minimum magnitude displayed is set to 3.5 (Note: less than 3.5 is classed as “Generally not felt, but recorded”). There was only one earthquake incident recorded just off the coast of Ireland ca. 60 km W of Belmullet, Ireland, which had magnitude of 4.0.

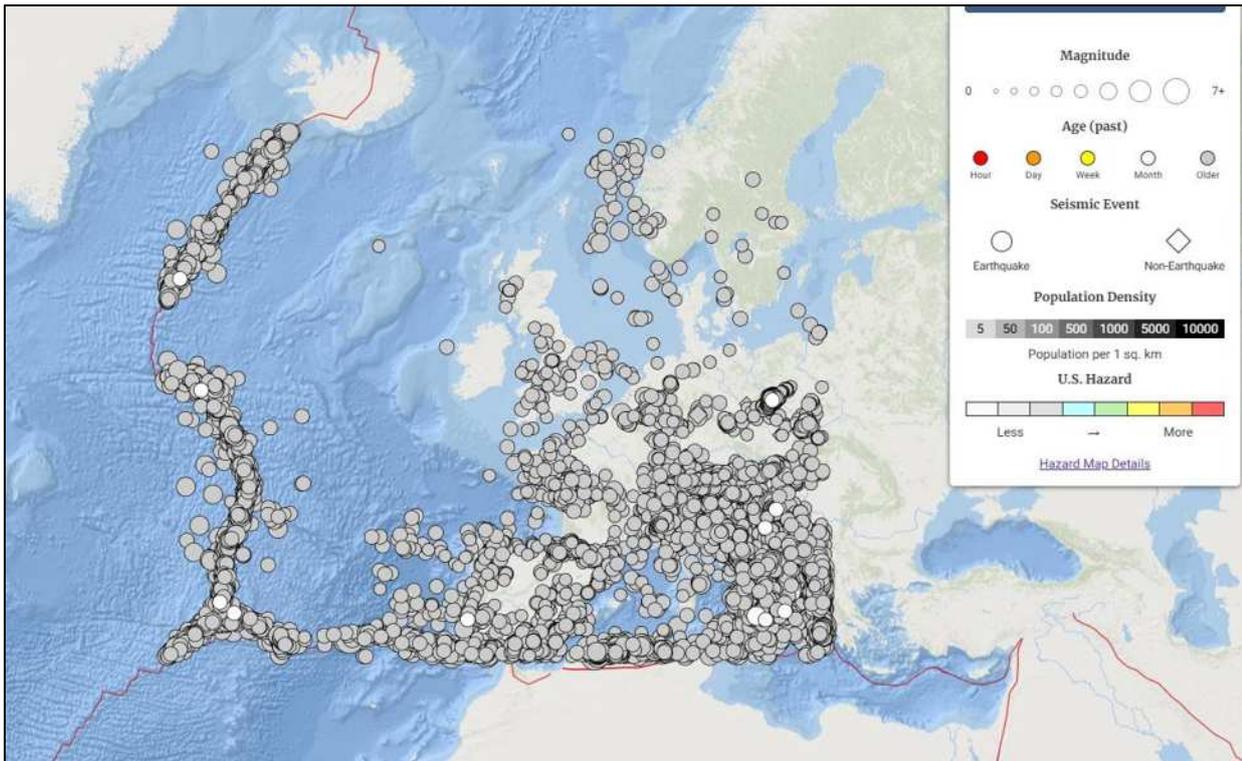


Figure 17.3: Map derived from data collated by the US Geological Survey showing the record of seismic incidents in Europe from 1925 to 2025, of min magnitude 3.5 (Source: US Geological Survey <https://www.usgs.gov/>)

According to the most recent model from the “2020 European Seismic Hazard and Risk Models”, in Ireland the hazard and risk of an earthquake are such that, (a) they are unlikely to occur and (b) if they did, would be of a scale that would be imperceptible or unlikely to cause damage to infrastructure. The earthquake hazard map in **Figure 17.4** overleaf shows the expected level of ground shaking at a specific location due to future potential earthquakes that might occur locally or at a greater distance.

Ground shaking is expressed as Peak Ground Acceleration (PGA), normally given in percentage of “g”, the Earth’s gravitational acceleration. The values displayed on the earthquake hazard map of Europe are based on the calculations of the 2020 European Seismic Hazard Model. Low hazard areas are coloured in white to green, moderate hazard areas in yellow to orange and high hazard areas in dark red to purple.

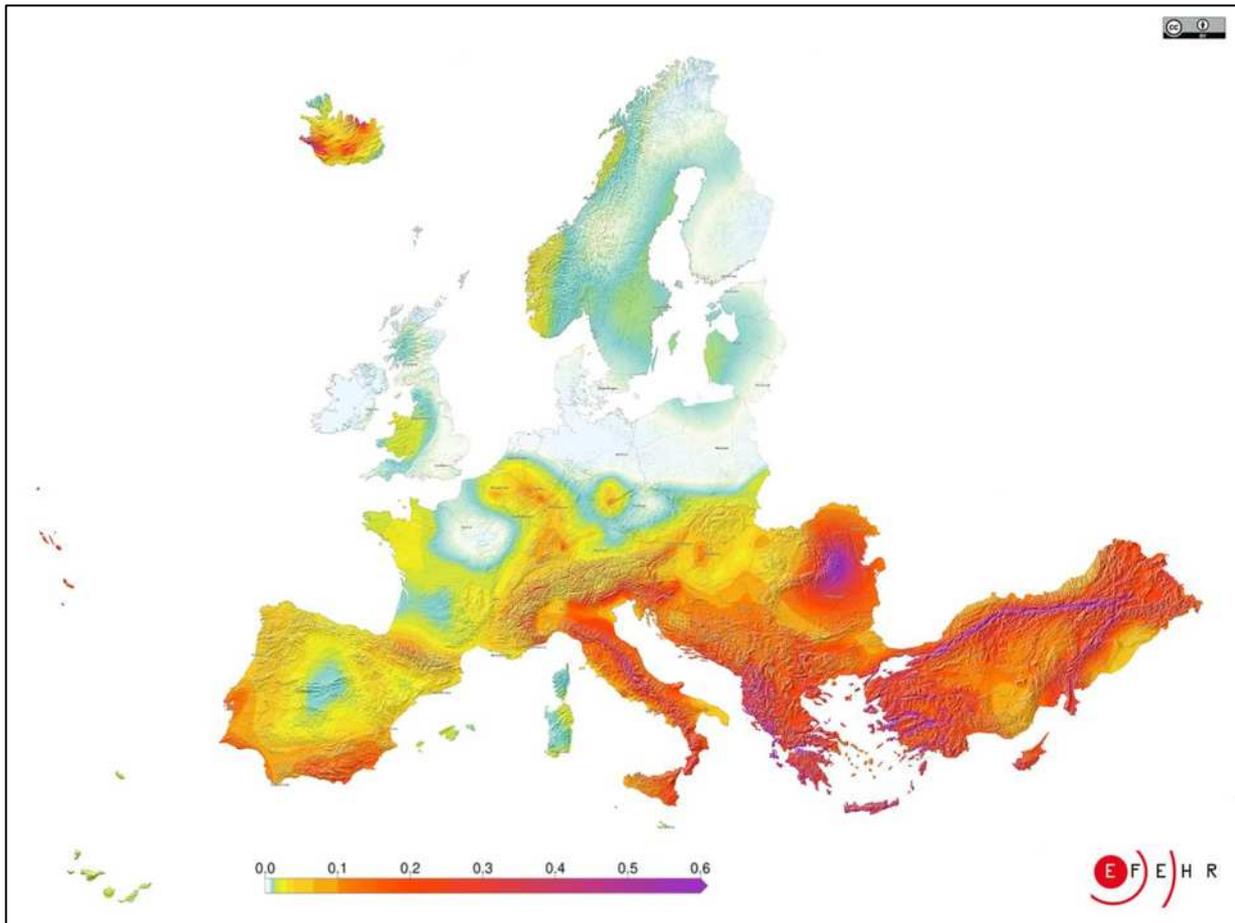


Figure 17.4: Earthquake hazard map of Europe, based on the calculations of [Europe's updated earthquake hazard model](http://www.efehr.org/earthquake-hazard/hazard-map/) (ESHM20) (Source: <http://www.efehr.org/earthquake-hazard/hazard-map/>)

17.4.2.5 Landslides

A landslide is the movement of material down a slope. This includes rock, earth, mud and peat. Landslides in Ireland mainly occur on steep mountain slopes. A landslide susceptibility map for Ireland has been created using a modelling method called the Unique Condition Unit (UCU). A unique condition unit is an area with a set of ground types. It tells us what the soil type is, what the slope is (angle of the ground) and where water flows. The UCU concept suggests that if a landslide has occurred in a specific set of conditions, similar conditions elsewhere are also susceptible to landslides. In order to generate a database for the model, an inventory of previous landslides was compiled. From this database a regional map that contains all known landslides in Ireland was created using Geographic Information Systems (GIS) with the type of landslide subdivided into the following five categories: bog flow, bog slide, creep, flow and rock fall. An illustration of the resultant landslide susceptibility map coloured according to likelihood of occurrence is shown in **Figure 17.5** overleaf. The purple dots represent the locations of where landslides have previously been reported.

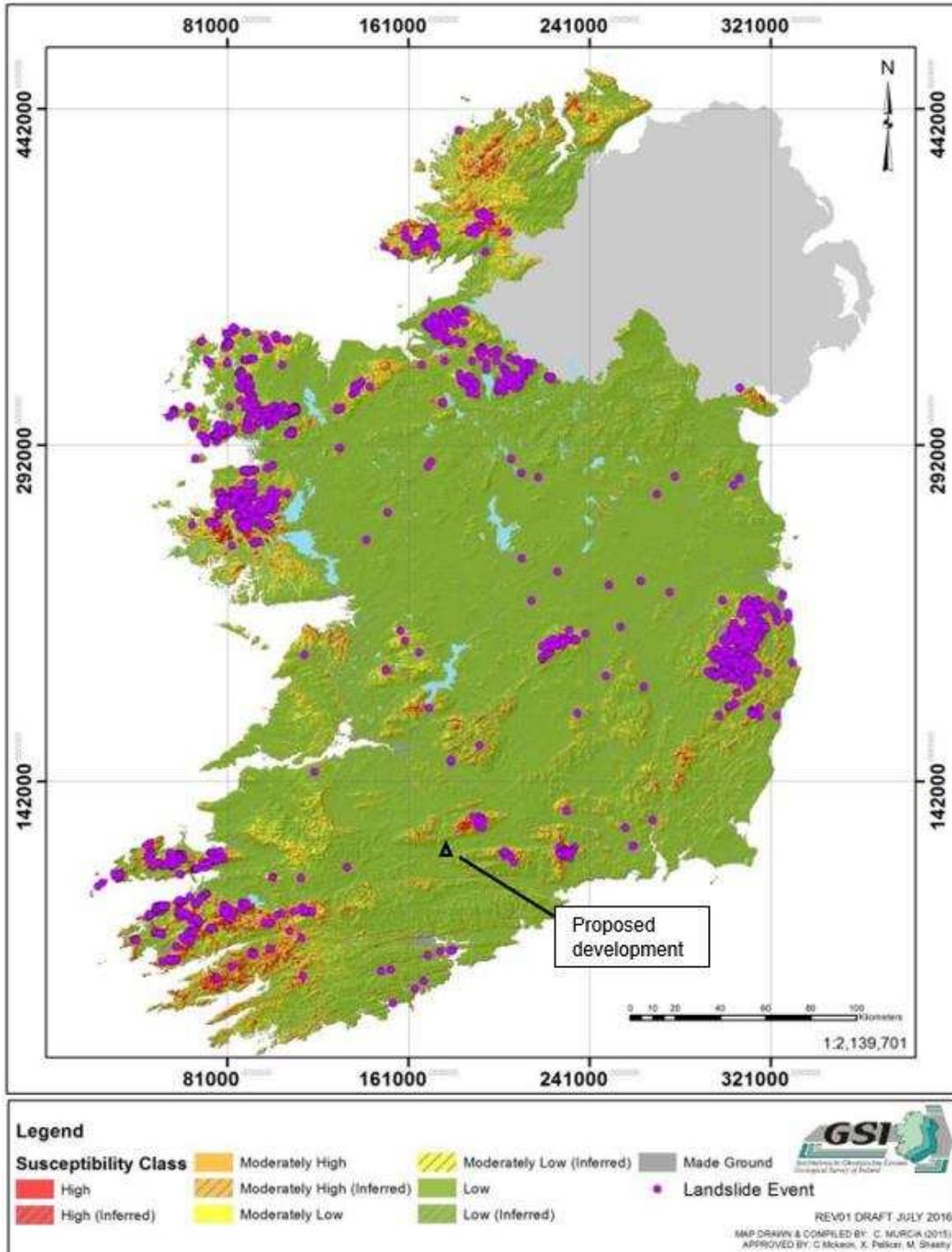


Figure 17.5: Illustration of Landslide Susceptibility. The purple dots represent the locations of where landslides have previously been reported. Source (GSI: National Landslide Susceptibility Mapping Project Summary)

Figure 17.6 overleaf shows the landslide susceptibility in the immediate vicinity of the Proposed Development site, as mapped by GSI. According to the GSI mapping, Corracunna has a low susceptibility to landslide. The GSI’s online landslide database indicates there are no historic landslides recorded on the site or within a 2km radius. The nearest recorded landslide is ca. 11.5 km northeast of the site on the slopes of the Galtee Mountains.



Figure 17.6: Landslide Susceptibility in immediate proximity of the Proposed Development site (Source: GSI mapping)

17.4.2.6 Wildfires

Wildfires are a more common risk in Irish upland landscapes than in lowland modified/improved grasslands and tend to be related to forest areas. In order to provide forest owners and land managers with advance warning of high fire risk weather conditions and permit appropriate readiness measures to be taken in advance of fire outbreaks, Met Eireann produce meteograms, which apply a fire weather index, ranging from a fire risk of very low to extreme. The fire model used is based on the Canadian Forest Fire Weather Index (FWI) System, which is adapted for Ireland and utilises components that account for the effects of fuel moisture and weather conditions on fire behaviour. These include fuel moisture content (such as that of the forest floor and other dead organic matter), the rate of fire spread, and fuel availability.

Regarding the Proposed Development site, which is classified as “Improved Agricultural Grassland” habitat, there have been no reports of fires at the site location. There have been a handful of incidences of gorse fires in the proximate uplands area since 2015, including the Galtee Mountains in 2015 and 2021, the Kilworth military range in 2015 and the Ardpatrick area in 2019. Reports from the incidents suggest all were started deliberately i.e. careless disposal of ignitable materials on dry grass/scrublands or burning of dead vegetation.

17.4.3 Existing Major Accident Hazards

This subsection considers potential hazards resulting from existing infrastructure which could impact the Proposed Development, including proximate location of COMAH sites, airports and sensitive infrastructure such as rail lines or utilities.

17.4.3.1 COMAH Sites

There are no COMAH sites in the immediate vicinity of the Proposed Development. The proposed Central Gas Injection (CGI) unit, which is currently under construction, is ca. 800m

east of the site, and will be classified as a lower tier regulation site under COMAH regulations. The closest currently operational COMAH site is LPG Cylinder Filling Limited, a lower tier COMAH site at Quarters town Industrial Estate, Mallow, Co. Cork, ca. 35km from the site.

17.4.3.2 Sensitive Infrastructure

The following subsection relates to sensitive civil infrastructure that could exacerbate an incident if not considered or in the absence of mitigation measures within construction management, emergency response plans or safety planning.

- The N73 passes along the southern boundary of the site and will be the main access route for construction traffic and during the operational phase. Establishing the pipeline connection to the existing gas network will require the implementation of temporary traffic management measures along the N73.
- There is currently a Medium Voltage (MV) (10kV/20kV) main line network, predominantly situated on the western side of the site, with overhead lines branching off in north, east, south and western directions over the site area from northwest to southeast. There is also a Low Voltage (LV) (400V/230V) overhead line which is located to the northeast corner of the site. These will require relocation.
- There is a high-pressure transmission pipe running along the southern side of the N73, exiting out of Mitchelstown and passing the Proposed Development site. A medium pressure distribution pipeline and network is located at Coolnanave, Co. Cork ca. 1.0km west of the site.
- The telecommunications overhead lines run along the site boundaries where access will be required, in particular the western boundary where the main site entrance will be situated.
- The Proposed Development will be approximately 800m west of the Central Grid Injection (CGI) Unit, which is currently under construction. Once operational this site will receive biomethane tankers, with pressures of up to 250bar.

17.4.3.3 Aircraft Impact

The closest airport to the Proposed Development site is Cork Airport, which is located ca. 50km south of the Proposed Development. **Figure 17.7** shows the plot of the Public Safety Zone (PSZ) for this airport. This is adapted from the “Cork Airport Special Local Area Plan September 2010”, produced by ERM (Environmental Resources Management) Ireland Ltd, under commission from the Department of Transport and the Department of the Environment and Local Government.

The dimensions of the Public Safety Zones (PSZs) proposed for the two runways at Cork Airport are described overleaf in **Table 17.6** and illustrated in **Figure 17.7**. The inner and outer PSZs relate to an individual risk of fatality of 1 in 100,000 per year and 1 in one million per year, respectively. The “red zone” corresponds to the “on the ground” risk and serves to aid safe navigation of aircraft and to protect the public on the ground. This is done by limiting the type and allowable height of buildings and structures within the zones.

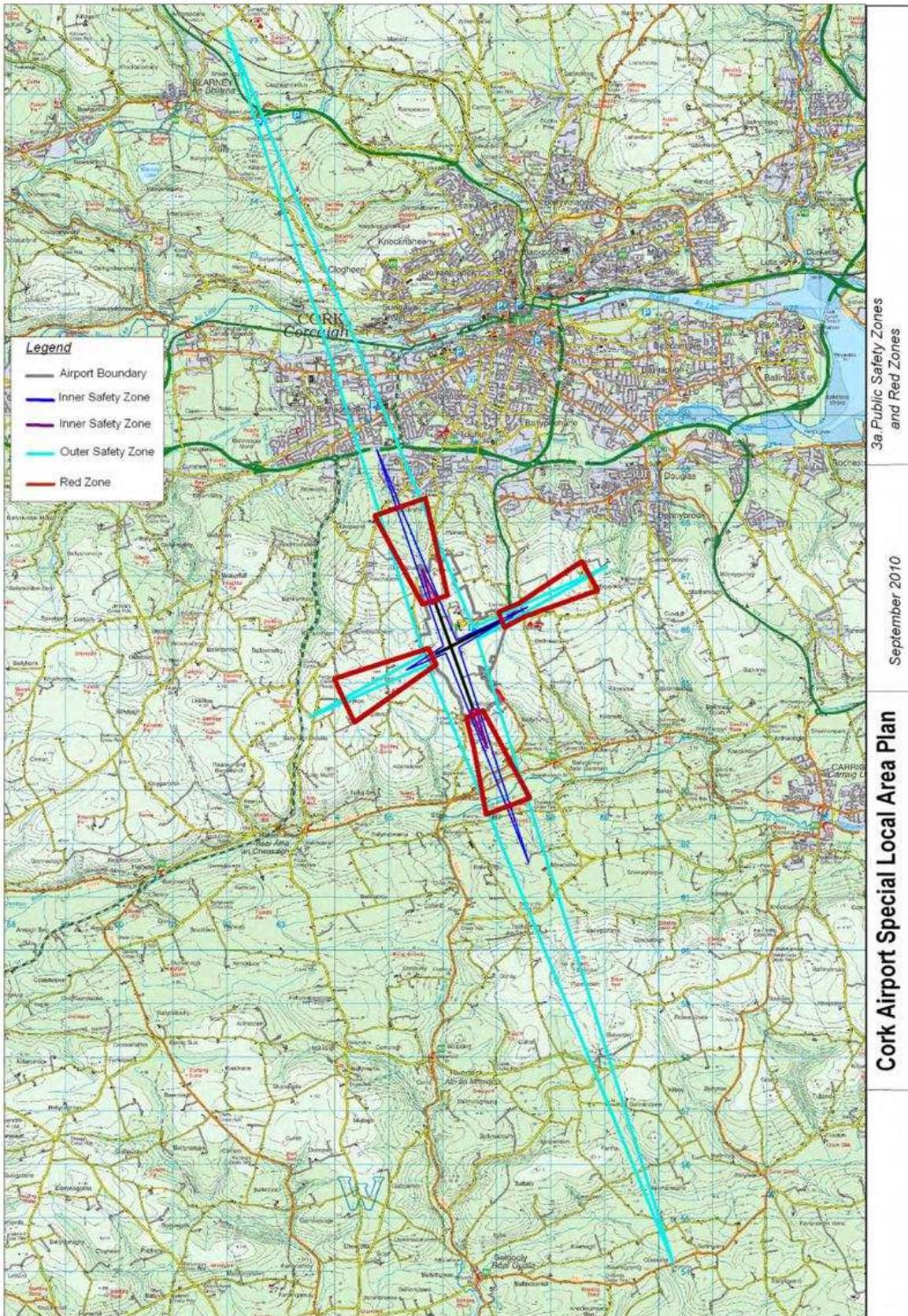


Figure 17.7: Cork Airport Public Safety Zones and Red Zones (The inner and outer PSZs relate to an individual risk of fatality of 1 in 100,000 per year and 1 in one million per year, respectively)

Table 17.6: Dimensions of the Public Safety Zones (PSZs) at Cork airport (Source “Cork Airport Special Local Area Plan September 2010” report)

	Inner PSZ	Outer PSZ
Main runway (towards the north – End 17)	3065m length beyond the runway, 260m width	11290m length beyond the runway, 962m width
Main runway (towards the south – End 35)	3055m length beyond the runway, 278m width	11015m length beyond the runway, 1056m width
Cross runway (towards the west – End 7)	625m length beyond the runway, 96m width	2615m length beyond the runway, 224m width
Cross runway (towards the east – End 25)	625m length beyond the runway, 96m width	2300m length beyond the runway, 170m width

As can be seen in **Table 17.6**, the public safety zone towards the north extends to ca. 11,290m at its maximum. Thus, given the distance of the Proposed Development site from the airport and its PSZs (ca. 50km), there will not be any increased vulnerability to aviation risk.

Kilworth training camp is ca. 7km south of the Proposed Development. This military barracks includes a firing range and occasionally conducts large scale training exercises that may include helicopter participation. However, this appears to be a rare occasion and so additional vulnerability due to helicopter strike is not anticipated.

17.4.4 Societal Risks

17.4.4.1 Terrorism/vandalism

The current security threat level in Ireland is classed as “moderate”, meaning that an attack is possible but not likely. Cyber threats are seen as posing the greatest risk to Ireland, as evidenced by the 2021 ransomware attack against the Health Service Executive. Given the one-off, self-contained nature of the Proposed Development, it is unlikely that it would be seen as a piece of key national infrastructure and so unlikely to be a target and so will not have an increased vulnerability risk due to terrorism.

Regarding potential for trespass/vandalism, given the rural location of the site, and the security measures on site e.g. the CCTV, fencing, containerised nature of plant equipment, the Proposed Development is unlikely to be a target and so will not have an increased vulnerability risk due to vandalism.

17.4.4.2 Pandemic

As seen with the COVID-19 pandemic, there is potential for widespread illness to cause disruption and temporary cessation of operations. For a facility like the Proposed Development, this could translate as reduced feedstock delivery, prioritisation of maintenance of critical infrastructure and reduced gas production. These are all operating conditions that have been considered as part of site design, including plant equipment fail-safes in the event of loss of system control and so additional vulnerability due to a pandemic is not anticipated.

17.5 Likely Significant Effects

This section identifies the significant adverse effects of the Proposed Development on the environment, deriving from the vulnerability of the development to risks of major accidents and/or disaster risk events as identified in **Section 17.3** above. The assessment considers the construction, and operation of the Proposed Development.

17.5.1 Do-Nothing Scenario

If the Proposed Development does not proceed there would be no additional impact on the sensitive receptors in the area. The site would likely continue to be used as agricultural pasture. A do-nothing scenario would leave the derelict former piggery and berm intact. The persistence of these degraded structures could pose a continuous risk to the land, soil and geology as described in **Chapter 7 – Land, soils and geology**, as well as the hydrology of the site through their continuous leaching, leakage or decay as described in **Chapter 8 – Hydrology and Hydrogeology**. The Proposed Development is focused on capturing and utilising methane, which is currently being emitted from the production of silage and land spreading of farmyard manure and slurry on livestock farms throughout the country. In this way, the Proposed Development is not only reducing emissions of a greenhouse gas (GHG) but also contributing towards Irelands climate goals by displacing current fossil fuels use with renewable energy. If the Proposed Development does not proceed, the opportunity of capturing this GHG and providing renewable energy to the national grid will be missed, as described in **Chapter 6 – Population and Human Health**.

17.5.2 Sources - Construction Phase

This section considers the effects relating to the occurrence of risk events during the construction of the Proposed Development and are summarised in **Table 17.7**.

Table 17.7: Cumulative risk for identified risk events, in terms of acceptability criteria where mitigation measures have been applied for during the construction of the Proposed Development

Risk ID	Risk Event (High Level)	Risk Description	Reasonable worst-case consequence if event did occur	Impact rating	Embedded mitigation	Likelihood rating	Risk Rating
C1	Spillage/ leak of pollutants into groundwater/ surface water	Risk of contamination of water resources due to activities, including excavation works for discharge pipe and site structures,	Significant damage to watercourse and dependant species/ habitats, in particular considering the River Funshion and riparian habitats at the discharge point Temporary contamination of water supply of immediate local population.	3	Impact avoidance measures related to leaks and spills are presented in section 8.6 of Chapter 8: Hydrology and Hydrogeology. A CEMP has been implemented to manage storage of construction materials and potential environmental impacts of construction works.	2	6- Acceptable
C2	Pluvial flood event affecting construction areas	Flooding of construction area causing secondary pollution by washing materials into flood water. Flooding displaces equipment causing increased flood risk due to equipment obstructing water	Damage to soil structure, contamination of surface water Infrastructural damage to adjacent populations Surface flooding of the N73	3	Proposed Development is in Flood Zone C Implement measures as in CEMP No earthworks during heavy rainfall to limit silt laden runoff and damage to soil structure Drainage silt chambers will be blocked off to prevent excessive silt outflows to the surface water drainage system.	1	3- Broadly acceptable
C3	Major road traffic accident	Construction work on/ adjacent to existing national road (N73). Movement of construction vehicles on local roads leading	Fatality/injury to members of the public	4	Risks to road users have been assessed in Chapter 12: Traffic and Transport and are not considered significant	1	4 - Acceptable Consider review, if construction activities align with CGI unit works

		to increased risk of road traffic accidents					
C4	Release of asbestos	Uncontrolled release of asbestos during demolition of existing structures	Short term exposure to construction personnel, and possibly members of the public in surrounding areas.	2	A watching brief will be adopted during the construction works and managed as part of the CEMP. If identified, risks will be managed to ensure legal compliance through the Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013), and Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations, 2006 (S.I. No. 386 of 2006), governing the handling and disposal of asbestos containing materials (ACM)	2	4 – Broadly Acceptable
C5	Domino effects due to interaction with adjacent infrastructure	Improper handling of overhead electricity network or phone network cables resulting in sparking causing electrical surge or fire	Injury to staff on-site due to electrocution or damage to infrastructure from sparking	4	Relocation of wires will be carried out by appropriate stakeholders including electricity supply board and phoneline provider, safety control measures as outlined by these parties will be implemented.	2	8 -Tolerable if ALARP Ensure close contact with appropriate stakeholders including electricity supply board and phoneline provider and ensure control measures are rigorously adhered to

17.5.3 Sources - Operational Phase

Potential Operational Phase effects are considered in detail below and are summarised in **Table 17.8**.

Table 17.8: Cumulative risk for identified risk events, in terms of acceptability criteria where mitigation measures have been applied for during the operational phase of the Proposed Development

Risk ID	Risk Event (High Level)	Risk Description	Reasonable worst-case consequence if event did occur	Impact rating	Embedded mitigation	Likelihood rating	Risk Rating
Op 1	Fire/explosion and risk of harmful release of gas	Rupture of gas membrane due to lightning strike	<p>If unignited, impact to climate due to GHG emissions.</p> <p>If ignited, air pollution from CO₂ and other combustion products, as well as climate impact</p> <p>If ignited, temporary noise pollution which may disturb species in vicinity.</p> <p>If ignited, potential for injury to on-site staff</p> <p>If ignited, potential for disruption to off-site members of public if on the road network in the immediate vicinity.</p>	4	<p>The lightning activity in Ireland is low as discussed in Section 17.4</p> <p>A risk management analysis was performed according to the IEC 62305-2 (EN 62305-2) standard, A Lightning Protection Level II (LPL II) is appropriate, and a lightning protection system has been designed for the site.</p> <p>The installations will be protected with lightning conductors to safely earth direct lightning strikes. The grounding system will be inspected regularly.</p> <p>Shut off valves on gas pipework allow digester to be isolated from the remainder of the plant quickly</p>	1	4 – Acceptable
Op2	Fire/explosion and risk of harmful release of gas	Rupture of gas membrane due to high wind speeds impact	<p>If unignited, impact to climate due to GHG emissions</p> <p>If ignited, air pollution from CO₂ and other combustion products.</p> <p>If ignited, temporary noise pollution which may disturb species in vicinity.</p> <p>If ignited, potential for injury to on-site staff</p>	4	<p>Site is low lying, and the landscape design has incorporated trees which will provide some screening from wind.</p> <p>The air cavity in the double membrane confers aero-elastic effects that serve to absorb loading due to variable wind speeds.</p> <p>The gas membrane is subject to regular inspection</p>	1	4 – Acceptable

			If ignited, potential for disruption to off-site members of public if on the road network in the immediate vicinity		Inclusion of multiple valves and branched sections to limit quantities of gas in various sections and to allow controlled emergency release of gas		
Op3	Fire/explosion and risk of harmful release of gas	Rupture of gas pipework due to impact e.g. fallen trees, debris from other structures, vehicle impact	<p>If unignited, impact to climate due to GHG emissions</p> <p>If ignited, air pollution from CO₂ and other combustion products.</p> <p>If ignited, temporary noise pollution which may disturb species in vicinity.</p> <p>If ignited, potential for injury to on-site staff</p> <p>If ignited, potential for disruption to off-site members of public if on the road network in the immediate vicinity</p>	3	<p>The digesters are inaccessible to regular vehicle users due to presence of bund; pipework routed overground is protected by impact barriers.</p> <p>Site is landscaped such that trees are not encroaching on the gas structures and health of foliage is managed as part of landscape management plan, whilst also providing screening between road and site structures.</p> <p>Hazardous area classification will be implemented to ensure ignition sources are not present in areas where ATEX zones are foreseeable.</p> <p>Inclusion of multiple valves and branched sections to limit quantities of gas in various sections and to allow controlled emergency release of gas</p> <p>Inclusion of emergency flare in design</p>	2	6 – Broadly acceptable
Op4	Fire/explosion and risk of harmful release of gas	Rupture of gas membrane due to over pressurisation	<p>If unignited, impact to climate due to GHG emissions</p> <p>If ignited, air pollution from CO₂ and other combustion products.</p> <p>If ignited, temporary noise pollution which may disturb species in vicinity</p> <p>If ignited, potential injury to on-site staff</p> <p>If ignited, potential disturbance to off-site members of public if</p>	4	<p>Pressure and level sensors installed in membranes to enable monitoring of digester conditions.</p> <p>Anti-foam dosing system installed on all digesters to mitigate foaming risk.</p> <p>Pressure set point in place also which triggers activation of flare to rapidly reduce gas volume and thus pressure in membrane</p> <p>Pressure relief valves installed to relieve pressure</p>	1	4 – Acceptable

			on the road network in the immediate vicinity		Regular visual monitoring will be carried out e.g. through sight glass. Hazardous area classification will be implemented to ensure ignition sources are not present in areas where ATEX zones are foreseeable. Training of staff to recognise process metrics e.g. understanding digestion behaviours of feedstocks.		
Op5	Fire/explosion and risk of harmful release of gas	LPG storage	If unignited, release of gas may have asphyxiating effects on nearby staff. Risk of fire/ explosion and release of harmful gas leading to fatality/ injury to site worker or member of public The impacts from fires and explosions are damage/pollution of the local environment and risks to people. Effects include pollution of soils and groundwater from fire water and foams, respiratory irritation to people from emission to air, impacts to local communities (disturbance due to the event). Secondary effects may occur from damage to the normal operations of the proposed biogas	4	The design and installation of the storage facility will be in line with industry standards and industry best practice, including 3216:2025 Code of Practice – Bulk Storage of Liquefied Petroleum Gas (LPG) Industry best practices procedures and current regulatory requirements will be followed for the location and operation of the storage facility, including a Hazardous Area and functional Risk Assessment. Inventory on site will be minimised to less than 1 Tonne i.e. comparable to domestic level storage quantities. Design features include: Siting controls and provision of adequate buffers to other infrastructure, lightning protection in accordance with industry standards, inclusion of impact protection barriers around the storage facility, inclusion and use of the correct level of intrinsically safe equipment and protective systems to minimise the available ignition sources in a flammable atmosphere if there were to be a loss of LPG.	1	4- Broadly acceptable

					<p>Tank will be subject to programme of maintenance and testing by competent persons as per industry interval requirements.</p> <p>An emergency response plan will be in place, which considers LPG release, including aspects such as enforcing safe separation distances.</p>		
Op6	Risk of release of harmful gas	CO ₂ release on site due to failure of tank	<p>Asphyxiation risk due to leaking of CO₂ from ruptured storage tank</p> <p>Carbon dioxide enriched atmosphere from leaking product, danger to personnel. Embrittlement of equipment. Reduced visibility from major product release</p>	4	<p>Impact barriers in place,</p> <p>The storage tank and CO₂ system are within the scope of the EU machinery directive (2006/42/EC) and the EU Machinery Regulation 2023/1230 I.e. built to specific EU standards and safety</p> <p>Safeguards as outlined in manufacturer risk assessment will be in place</p> <p>Safe distances applied as suggested in BGCA code of practise for carbon dioxide</p> <p>Staff trained in appropriate handling of bulk carbon dioxide using recommendations from industry. E.g. Doc 56, Guidelines for handling Bulk Carbon Dioxide</p> <p>An emergency response plan will be in place for gas release scenarios</p>	1	<p>4 – Broadly acceptable</p> <p>Once received, review supplier risk assessment and design safeguards, including pressure relief valves, flow/pressure limit switch and implement additional measures if any as outlined in risk assessment</p>
Op7	Risk of release of harmful gas	CO ₂ release from tankers due to failure of tanker	<p>Carbon dioxide enriched atmosphere causing asphyxiation risk to staff. Embrittlement of equipment. Reduced visibility from major product release</p>	4	<p>The filling, labelling, inspection and transport of cylinders shall be carried out according to ADR</p> <p>Tankers have inbuilt safety features such as segregation to reduce gross volume in storage containers, pressure relief devices to release boil-off gas.</p>	1	<p>4 – Broadly acceptable</p> <p>Ensure mitigation measures are rigorously enforced e.g. regular inspections of</p>

					<p>Tanker subject to regular inspection e.g. assessing for embrittlement, fatigue of valves etc.</p> <p>An emergency response plan will be in place for the scenarios including an offsite road traffic accident (RTA) that results in tank rupture. Provision will be put in place for the main site to respond e.g. aid with enforcing safety distances, contact with dangerous goods safety adviser (DGSA).</p>		<p>tankers, staff training up to date, risk averse approach to driving.</p>
Op8	Vandalism	<p>Malicious attack causing damage to the equipment could lead to leaks and spillages of chemicals or fuels resulting in contamination or release of hazardous substances to the environment.</p>	<p>Damage causes feedstock and gas generation processes to stop functioning as per normal operation</p>	2	<p>Not manned 24 hrs but site will be fully fenced to a height of approx. 1.8m. and locked outside of operational hours.</p> <p>CCTV monitored 24hrs</p> <p>All units are either containerised e.g. CHP, upgraders, in lockable buildings e.g. reception hall, boiler room or sensitive components are out of immediate proximity e.g. PRVs on membranes.</p> <p>Engineering safeguards in place so that systems will "fail safe" in the event of loss of communications e.g. software feedback mechanisms such as pausing of digester feeding in the event of errors, fail-close valves, emergency start-up of flare, automatic safe shut down of upgrader, CHP etc.</p>	2	4 – Broadly acceptable
Op9	Major road traffic accident	<p>HGV collision with other road users</p> <p>HGV going off road into ditch</p>	<p>Fatality/injury to members of the public or staff</p> <p>Rupture of tank, resulting in run off of pollutant to land</p> <p>Rupture of tank resulting in release of odours</p>	4	<p>Resultant traffic generated by the development is not expected to contribute to congestion or other deviations from typical road conditions in the area as discussed in Chapter 12: Traffic and Transport.</p> <p>Sightlines at the priority junction will be improved as part of the development</p>	2	8 - Tolerable if ALARP

					<p>Drivers will be trained on risk averse driving approach. HGV consignments will aim to be timed to avoid peak times on the road.</p> <p>An emergency response plan will be put in place for the eventuality of an RTA that results in tank rupture. Provision will be put in place for the main site to respond e.g. availability of vacuum tanker, spill booms etc.</p>		
Op10	Domino effects from incidents at neighbouring facilities	Incident where vehicle containing compressed biomethane (at central grid injection unit) has event resulting in release of gas	<p>If ignited could result in an ignited jet fire, which could impinge on infrastructure on site.</p> <p>Fire impingement could cause release of substances as outlined in earlier risk events, resulting in burn injury to staff on site, air pollution from CO₂ and other combustion products, as well as climate impact.</p> <p>If ignited, temporary noise pollution which may disturb species in vicinity</p> <p>If ignited, potential injury to on-site staff</p> <p>If ignited, potential disturbance to off-site members on road network in vicinity of the site</p>	4	<p>Biomethane Multiple Element Gas Cylinders (MEGCs) are designed with safeguards such as limiting available flammable inventory in event of cylinder failure through use of multiple cylinder bank setup, inbuilt directed pressure relief e.g. orienting upwards</p> <p>Though gas injection will be lower tier COMAH site, applying typical suggested separation distances for tank ruptures, there is sufficient distance (ca. 800m) between the two sites such that an incident relating to release of pressurised gas, either unignited or ignited, at one site would not result in an incident at the other site</p> <p>Presence of screening material e.g. trees, as well bund wall and existing impact barriers around sensitive structures would continue to provide impact protection</p>	1	4 – Broadly acceptable
Op11	Domino effects from incidents at	Disconnecting overhead power lines initiating		4	Relocation of overhead wires as part of development such that there is sufficient	1	4 – Broadly acceptable

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	neighbouring facilities	sparking off site infrastructure			separation in the event of disconnection of wires.		
Op12	Accidental drowning	Risk of staff falling into reception pits during offloading	Fatality of member of staff	4	Concertina type door that only opens during delivery Opening sized so that operator can't fall into pit, with safety grate over the opening Staff trained on correct operating procedure for offloading feedstock	1	4 – Broadly acceptable
Op13	Accidental drowning	Risk of 3rd party access/ trespassers falling into attenuation pond.	Fatality of member of the public	4	Attenuation ponds will be fenced with appropriate warning signs. CCTV on site Site fencing all around site	1	4 – Broady Acceptable

17.6 Mitigation Measures and Monitoring

The mitigation measures relating to the identified major accident hazards for both the construction phase and the operational phase are outlined in detail in **Table 17.7** and **Table 17.8** in **Section 17.5**.

17.6.1 Construction Phase

During the construction phase, the site will not be producing biogas, storing LPG or receiving and processing biological feedstocks and as such will not have any additional biogas sector specific risks. Thus, all mitigation measures for the construction phase will be applied, as described in the respective EIAR chapters, technical reports and summarised in **Chapter 16 – Schedule of Mitigation**.

Regarding the vulnerability of the Proposed Development to major accidents and disaster during the construction phase, it is proposed that the only credible scenarios that could result in a major accident as per the definition in **Section 17.3** would relate to relocation/installation works of the surrounding civil infrastructure, and significant contamination of the River Funshion during discharge pipe works, due to extreme weather conditions.

Regarding civil infrastructure works, specifically relocation of the electricity and telecommunication wires, and excavation works for the new gas pipeline, these works will be undertaken by the appropriate stakeholders such as Gas Networks Ireland, ESB and the National Transport Authority. During these works and the sites own construction works, site workers will maintain close contact with these stakeholders and ensure that both CEMP measures and stakeholders control measures are rigorously adhered to.

Regarding potential for contamination of the water course, impact avoidance measures related to leaks and spills are presented in **Section 8.6** of **Chapter 8: Hydrology and Hydrogeology**. A CEMP has been implemented to manage storage of construction materials and potential environmental impacts of construction works.

17.6.2 Operational Phase

The assessment has identified the potential Major Accidents and Disasters which could be applicable to the Proposed Development, considering the substances present and operations to be undertaken. Principally, these could include fires/explosions of flammable gases, the release of CO₂ gas, and loss of containment of animal by-products (ABP). These incidents have an extremely low probability of occurrence but could have significant impacts on people and the environment without mitigation.

Though not specifically in Ireland, the biogas industry is well established in Europe and the UK, where hazards are well understood by plant operators and controlled by the regulatory authorities. The Applicant has a number of team members who have direct experience of working in these established sectors and so will draw on this expertise, and will utilise suppliers that have experience of designing, building and operating AD facilities globally to reduce the risk of major accidents occurring to ALARP.

The engineering design of the Proposed Development has incorporated appropriate standards, proven design methods and control measures necessary to reduce the risks of such accidents to an acceptable level, i.e. ALARP.

The Proposed Development will require appropriate permissions to be in place for its operation including an Industrial emissions licence issued by the Environmental Protection Agency and an Approval under CN11 Conditions for approval and operation of Biogas Plants transforming Animal By-Products and derived products in Ireland, issued by the Department of Agriculture, a waste license and must adhere to health and safety legislation and codes of practice as regulated by the HSA. These regulatory controls will stipulate a number of requirements that must be demonstrated to prevent or minimise the effects of major accidents

With the implementation of these measures in addition to those described in **Table 17.7** and **Table 17.8** above, the risks are considered to have been mitigated to 'tolerable if ALARP' and therefore the effects are considered as 'not significant' for both plant construction and operation.

General Mitigation Measures

An Environmental Management System (EMS) (accredited to ISO 14004 standard) will be prepared and implemented by the operator during the operational phase. This is a practical document which will include detailed procedures to adhere to.

The Proposed Development will operate under an Industrial Emissions Licence (IEL) issued by the Environmental Protection Agency (EPA). The licence will contain several conditions which the operator must remain in compliance with for the entire duration of the facility's lifespan. Typical conditions relating to the prevention of accidents include:

- Monitoring requirements for water courses, emission points and noise output
- Resource use and energy efficiency
- Waste management control and documentation
- Demonstrable safe storage and transfer of substances
- Facility management
- Accident prevention and emergency response including fire water retention
- Operational Controls

17.7 Cumulative Effects

The cumulative effects considered both the potential for an incident at the Proposed development site acting as an initiator for incidents at other sites and the potential for incidents at other sites causing an incident at the Proposed development site.

17.7.1 Interactions

Within the European Commission - Guidelines for the Assessment of Indirect and Cumulative effects as well as Impact Interactions, dated May 1999, cumulative effects are described as "effects" that result from incremental changes caused by other development, plans, or projects together with the Proposed Development or developments".

The Central Grid Injection (CGI) Unit, which has commenced construction, is situated 800m east of the site. This site will be operated under strict regulation by Gas Networks Ireland and adhere to health and safety regulation, including requirements for lower tier COMAH. Given the modular nature of the gas tankers e.g. multiple element gas cylinders resulting in smaller gas quantities in each gas cylinder unit, there is sufficient separation distance between the gas injection site, and this proposed development such that an incident at one site is not expected

to cause an incident at the other.

17.7.2 Potential Cumulative Impacts

Construction Phase

The phasing/commencement of other future permitted developments in the locality e.g. the central gas injection (CGI) site, could potentially result in the scenario where a number of other construction sites are in operation at the same time as the Proposed Development. Considering the mitigation measures outlined in this report and the expected residual effect pending successful implementation of those measures, the development is not considered to significantly contribute to cumulative adverse impacts in terms of major accidents and disasters.

Operational Phase

In the absence of mitigation measures, fire/explosion and release of harmful gas, spillage/leak of chemicals or pollutants into groundwater/ surface water or major road traffic accident due to initiating events such as extreme weather, malicious vandalism or vehicle impact could result in a major accident.

Considering the mitigation measures outlined in this report and the expected residual effect pending successful implementation of those measures, the development is not considered to significantly contribute to cumulative adverse impacts in terms of major accidents and disasters.

17.8 Residual Effects

According to Environmental Protection Agency guidelines, Residual Impact is described as 'the degree of environmental change that will occur after the proposed mitigation measures have taken place.'

17.8.1 Construction Phase

During the construction phase, there are no expected major accident hazard implications and as such the site-specific Construction Environmental Management Plan (CEMP) will contain all the necessary procedures required to prevent and minimise any environmental risks posed by the project on the surrounding environment.

17.8.2 Operational Phase

Regarding the operational phase, with the implementation of the mitigation measures, no likely significant residual effects are expected. As the site will be licensed by the EPA, an environmental liabilities risk assessment (ELRA) and a closure restoration and aftercare management plan (CRAMP), in accordance with the EPA's guidance will be developed and submitted with the license application. The applicant will also ensure that appropriate financial provisions are in place, in accordance with the EPA guidance.

17.9 Summary of Significant Effects and statement of significance

The effects and their significance of the Proposed Development with respect to major accidents and disasters has been assessed based on design documentation to date. Event risks relevant

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to the construction and operation of the Proposed Development have been assessed in this Chapter. The mitigation measures for the construction and operational phases have been outlined in **Section 17.6** to ensure that the Proposed Development's vulnerability to accidents and disasters results in the risk of potential significant effects being ALARP. Considering the proposed mitigation measures, there are no expected significant effects arising from the vulnerability of the Proposed Development to major accidents or disasters.

Appendix 17.1 – Major accident scoping out of assessment

	Major accident or disaster hazard	Reason for scoping out
1	Aircraft strike	The site is not close enough to an airport to expect aircraft to be present at a low enough level to risk an impact
2	Domino effect - Offsite vehicle impact to infrastructure	Given the proposed landscape screening in place, good road sightlines and straightness of road at that location it is thought unlikely that the trajectory of an exiting vehicle from the bordering roads would be towards the site or that it would penetrate the existing and proposed additional trees
3	Ground collapse/landslide	The topography of the site is a shallow incline and so not susceptible to soil slip/collapse. Risks of creating ground instability will be managed as outlined in the CEMP and Chapter 7 Land, soils and geology. SUDS systems have been implemented in the design with design capacity for high rainfall events. Use of flow control valves and penstock valves to facilitate surface water run off flow control – set to mimic greenfield run off
4	Fire/Explosion from offsite gas pipeline rupture	Gas pipeline is on opposite side of the road to that of the site boundary and so unlikely to be interacted with during site construction works. All gas pipeline installation/construction works are to be carried out by Gas Networks Ireland and in consultation with appropriate stakeholders such as the National Transport Authority
5	Pluvial flooding on site	The SUDS design considers rainwater volumes for a 1 in 100-year event with an allowance for climate change (20%) e.g. with flow control valves, attenuation pond SUDS systems implemented in design with design capacity for high rainfall events. Use of flow control valves and penstock valves to facilitate surface water run off flow control – set to mimic greenfield run off
6	Fluvial flooding	Site outside any flood mapped zones for nearby watercourses as outlined in the Flood Risk Assessment and Chapter 8 Hydrology
7	Impact to diesel storage causing fire	Storage tank is bunded and protected, Diesel has relatively high flash point > 52°C and present in relatively low quantities (1000L) and sited remote from other hazardous substances and plant equipment