17.0 MAJOR ACCIDENTS AND DISASTERS

17.1 INTRODUCTION

This chapter assesses the potential for significant effects on the environment arising from the vulnerability of the proposed power plant to risks of major accidents and/or disasters. This chapter seeks to determine:

- The relevant major accidents and/or disasters, if any, that the proposed power plant could be vulnerable through the construction, operation and decommissioning phases;
- The potential for these major accidents and/or disasters to result in likely significant adverse environmental effect(s); and
- The measures that are in place, or need to be in place, to prevent or mitigate the likely significant adverse effects of such events on the environment.

17.2 METHODOLOGY

17.2.1 CONTEXT

The methodology for this assessment is based on the following requirements which is set out in Schedule 6 of the Planning and Development Regulations, 2001, as amended:

"a description of the expected significant adverse effects on the environment of the proposed development deriving from its vulnerability to risks of major accidents and/or disasters which are relevant to it. Relevant information available and obtained through risk assessments pursuant to European Union legislation such as the Seveso III Directive or the Nuclear Safety Directive or relevant assessments carried out pursuant to national legislation may be used for this purpose, provided that the requirements of the Environmental Impact Assessment Directive are met.

Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for, and proposed response to, emergencies arising from such events".

17.2.2 SITE SPECIFIC RISK ASSESSMENT METHODOLOGY

The site-specific risk assessment identifies and quantifies risks focusing on unplanned, but possible and plausible events occurring during the construction and operation of the proposed power plant. The approach to identifying and quantifying risks associated with the proposed development by means of a sites specific risk assessment is derived from the Draft EPA Guidelines on information to be contained in EIAR (EPA 2017).

The criteria for categorising impact is derived from the EPAs Guidance on Assessing and Costing Environmental Liabilities (2014). In this guidance, the risk assessment methodology commences with the establishment of risk classification criteria followed by risk analysis based on these criteria. Risk classification tables are required in order to evaluate and rank the risks compared with each other. They form the basis for rating the likelihood of an event occurring and the consequence of impact if the event occurs. The likelihood and consequence ratings are combined to form a risk score for risk evaluation (see Table 17-1 and Table 17-2)

Table 17-1: Risk Classification - Likelihood[51]

Rating	Category	Description
1	Very low	Very low chance of hazard occurring
2	Low	Low chance of hazard occurring
3	Medium	Medium chance of hazard occurring
4	High	High chance of hazard occurring
5	Very high	Very high chance of hazard occurring

Table 17-2: Risk Classification - Consequence[52]

Rating	Category	Description
1	Trivial	No impact of negligible change to the environment
2	Minor	Minor impact/localised or nuisance occurring
3	Moderate	Moderate impact to environment of hazard occurring
4	Major	Severe impact to environment
5	Massive	Massive impact to a large area, irreversible in medium term

The risks are the ranked according to their own risk score in a colour coded matrix table which allows risks to be easily displayed and prioritised. The colour codes are as follows:

- Red – high level risks requiring priority action;
- Yellow – medium-level risks requiring action, but not as critical as red-coded risks; and
- Green (light and dark) – low-level risks requiring continuing awareness and monitoring on a regular basis.

17.3 BASELINE ENVIRONMMENT

17.3.1 DUBLIN REGION CLIMATIC EVENTS

The graphic below sourced from South Dublin County Councils Climate Change Action Plan 2019-2024 summarises the climatic events recorded by Met Éireann that have occurred in the

[51] EPA (2014) Guidance on Assessing and Costing Environmental Liabilities

[52] EPA (2014) Guidance on Assessing and Costing Environmental Liabilities

Dublin Region over the last 32 years. These events were recorded due to their unique intensity and abnormal weather patterns. The effects of these major events are not purely economic; they also highlight social and environmental impacts and vulnerabilities.

TYPE	DATE	DESCRIPTION
Hurricane Charley	August 1986	Pluvial – worst flooding in Dublin in 100 Years.
Pluvial & Strong Winds	February 1990	Heavy rain and consequently flooding, with long periods of strong winds. All weather stations reported gale gusts.
Pluvial/Fluvial	June 1993	100 mm of rain fell in Dublin and Kildare (more than three times the normal amount).
Extreme Temperatures	June - August 1995	Warmest summer on record, with mean air temperatures over two degrees above normal in most places. Temperatures rose to around 30°C on a number of days and night time minimum temperature remained above 15°C for many weeks.
Windstorm	December 1997	Conditions were severe in much of Leinster, especially the south and east. In the Dublin area there were record gusts of 150 km/h, with maximum 10-minute winds of storm force.
Fluvial	November 2000	250 properties flooded in Dublin, 90.8 mm of rain fell. Significant disruption and damage.
Fluvial	November 2002	Similar to the 2000 flood, 80 mm of rain fell in Dublin.
Extreme Temperatures	Summer 2006	Warmest summer on record since 1995.
Pluvial	August - September 2008	76 mm of rain fell at Dublin Airport. Severe flooding in areas, many of which had no previous history of such flooding. Over 150 residential properties were inundated, as well as commercial premises, public buildings, major roadways, etc.
Pluvial	July 2009	This was a 1-in-50-year event. Several areas within the Dublin Region were severely affected.
Extreme Cold	December 2010	It was the coldest of any month at Casement Aerodrome in 50 years. Casement Aerodrome's temperature plummeted to -15.7°C on Christmas Day, the lowest temperature ever recorded in the Dublin Region.
Pluvial/Fluvial	October 2011	This was between a 1-in-50 and a 1-in-100-year event across the majority of Dublin. Properties and roads were flooded, some electricity customers had no power supply in the County.
Storm Darwin	February 2014	1-in-20 year event, with gusts of 100-110 km/h in Dublin. Considerable damage to housing and other buildings. 8,000 ha of forests damaged. Status: Yellow
Storm Ophelia	October 2017	First storm to come from a southerly direction, with damaging gusts of 120 to 150 km/h. 100 large trees blown over in the Dublin Region and significant damage to buildings throughout the country. Status: Red
The Beast from the East and Storm Emma	February – March 2018	Met Éireann issued its first Status Red warning for snow on record. Closure of all schools in the country, many businesses affected, water and power restrictions or outages. Status: Red
Extreme Temperatures	Summer 2018	Drier and warmer weather than normal throughout Ireland, with drought conditions in many areas, including Dublin. Temperatures reached 28°C, with above-average sunshine and heat wave conditions. Water restrictions were in place for the country for most of the summer. Status: Yellow
Storms Ali and Bronagh	September 2018	Storm Ali brought widespread, disruptive wind, which led to the delay or cancellation of most flights to and from Dublin Airport. Storm Bronagh passed over the east of Ireland bringing heavy rain. Mean wind speeds between 65-80 km/h and gusts between 110-130 km/h. Status: Orange

17.4 ASSESSMENT OF SIGNIFICANT EFFECTS

17.4.1 DO NOTHING SCENARIO

In the do-nothing scenario, the potential risk of the proposed power plant causing, or being affected by a disaster and/or major accident would be eliminated as the project would not be progressed.

17.4.2 APPLICATION OF SEVESO DIRECTIVE

The inventory of substances to be stored on the proposed power plant is not subject to any of the requirements contained in the Chemical Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 which implement the Seveso III Directive, the main EU legislation dealing specifically with the control of onshore major accident hazards involving dangerous substances, into Irish law.

17.4.3 POTENTIAL MAJOR ACCIDENTS OR DISASTERS

Table 17-3 sets out the potential major accidents and disasters which have been considered in the context of the proposed power plant.

Table 17-3: Summary of Major Accidents

Ref.	Process	Potential Risk of Major Accident	Phase	Impact	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score
1	Extreme heat or cold weather	Extremities could result structural damage and/or pollution to soils, groundwater or surface waters	Construction / Operation / Decommissioning	Human health, biodiversity, soils and geology, hydrology and hydrogeology	2	The power plant will be constructed, operated and decommissioned in accordance with all relevant planning, building and environmental licencing codes.	1	The plant is not considered to be at risk during storms or during extreme heat or cold event, any more so than other significant buildings or structures.	2
2	Storm events	Storm events could result structural damage and/or pollution to soils, groundwater or surface waters	Construction / Operation / Decommissioning	Human health, biodiversity, soils and geology, hydrology and hydrogeology	2	As above	1	As above	2
3	Flooding	Project could be at risk of flooding or give rise to flooding at downstream locations	Construction / Operation / Decommissioning	Hydrology	2	Site not at risk of pluvial or fluvial flooding	2	Based on the indicative flood mapping produced as part of the National PFRA Study, the site of the proposed power plant is not at risk of fluvial flooding from watercourses in the area. The topography of the site also provides a natural overland flow path to convey water away from the essential infrastructure.	4

Ref.	Process	Potential Risk of Major Accident	Phase	Impact	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score
								It is calculated that the stormwater management system proposed as part of the development will limit runoff from the site to greenfield runoff rates, therefore mitigating against an increase in flood risk elsewhere.	
4	Pollution to soils / groundwater / surface waters	Pollution to soils, groundwater or surface waters	Construction / Operation / Decommissioning	Human health, biodiversity, soils and geology, hydrology and hydrogeology	3	In order to mitigate potential impacts during the construction phase, best practice construction methods will be implemented in order to prevent water (surface water and groundwater) pollution	1	The construction phase of the proposed development will be carried out in accordance with good practice construction methodologies, all relevant health and safety guidance and legislation, as well as the provisions of the CEMP, as detailed in this EIAR.	3
5	Failure of emissions abatement control systems	Atmospheric emissions which exceed EPA Industrial Emissions Licenced parameters	Operation	Impact on air quality, human health, biodiversity	2	Low change of increased emission levels occurring, as CEMS in place for detection	2	Continuous Emission Monitoring Systems (CEMS) provided to monitor the plants emissions to atmosphere as required by Industrial Emissions licence. This system will be inspected on a regular basis.	4

Ref.	Process	Potential Risk of Major Accident	Phase	Impact	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score
6	Gas Engine operations	Leak of natural gas	Operation	Potential impact on adjacent properties. Potential fire and smoke.	4	Only small leaks are credible.	1	The gas engine will be protected from fire using an water mist based extinguishing system as well as optical flame detection, hydrocarbon sensing and thermal detectors. The engines will be fitted with pressure monitoring to detect a pressure drop and a gas detection system that will be interlocked with the plant control system.	4
7	Gas Engine operations	Leak of natural gas	Operation	Temporary offsite air quality impact due to release of combustion gases	4	Only small leaks are credible.	1	Regular inspection and maintenance of the gas engines systems and testing of emissions	4
8	Gas engine operations	Leak from the lubricating oil cooling system	Operation	Potential on-site health impact due to inhalation of lubricating oil vapours. Risk of fire. Possible environmental contamination of soils and ground water.	2	Lubricating oil will not be volatile; therefore, potential for offsite migration of vapours would be limited. The lubricating oil cooling system will be bunded. This bund will retain any leaks.	2	The lubricating oil cooling system will be subject to regular inspection and maintenance to avoid leaks,	4
9	Station transformer	Fire in a transformer resulting in emissions of	Operation	Temporary off site air quality impact	2	All outdoor transformers will be bunded, blast protected and fire	2	Standard transformer protection systems such as Bucholz relays will be used	4

Ref.	Process	Potential Risk of Major Accident	Phase	Impact	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score
		combustion products				protected according to EirGrid standards and relevant international standards such as NFPA 850. Transformer oil is of low volatility. The process control system would shut down the plant in the event of a fire being detected in the transformer building/area. Rapid dispersion of combustion gases would occur.			
10	Tanker unloading / delivery operations	Spillages	Operation	Risk of contamination of soils or groundwater	3	Diesel oil is a stand by fuel only and tanks will be replenished only in rare circumstances. The plant will operate on gas and only on diesel oil in emergency scenarios.	1	Where refuelling is to take place on site, it will be in bunded areas which will be the subject of regular inspection and integrity testing.	3
11	Low sulphur diesel oil storage tank	Leaks	Operation	Risk of contamination of soils or groundwater	3	Diesel oil would leak into a bunded are which is a concrete	1	Tanks will be bunded in accordance with EPA Industrial Emissions Licence conditions.,	3

Ref.	Process	Potential Risk of Major Accident	Phase	Impact	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score
						structure and will retain any such leaks.			
12	Low sulphur diesel oil storage tank	Catastrophic failure of storage tank	Operation	Rapid release of distillate oil. Possible overtopping of the bund and release into site drainage and potentially the environment. Possible contamination of soils or groundwater	4	Tank bunded to EPA requirements.	1	Tank will be bunded in accordance with EPA requirements as set out in IEL conditions or otherwise as specified in the EPA's Guidance to Storage and Transfer of Materials for Storage and Transfer for Scheduled Activities (2004)	4
13	Low sulphur diesel oil storage tank	Tank fire or bund fire	Operation	Temporary offsite air quality impacts. Possible risk to onsite personnel due to smoke inhalation or exposure to thermal radiation. Possible contamination of soils or groundwater.	4	Though very unlikely a bund fire would be difficult to extinguish and could burn for a long time.	1	Low sulphur distillate oil has a high flash point and is not categorised as flammable. There will be no sources of ignition within the bund. In the remote event of the diesel being ignited a pool fire will result. The worst case pool fire in terms of consequence assumes the loss of the entire contents of the tank into the bunded area, noting that the bunded area	4

Ref.	Process	Potential Risk of Major Accident	Phase	Impact	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score
								exceeds 110% of the volume of the tank.	
14	Low sulphur diesel oil storage tank to gas engines	Failure of pipework	Operation	Leakage of diesel and potential impact to soils or groundwater	3	Small bore pipework with isolation valves. Leak into system which has storage and petrol interceptors.	1	System would be used rarely given plants operation on natural gas. System controls will ensure the probability of this occurring is very low.	3
15	Chemical storage room	Leakage of chemical from storage containers or pipework	Operation	Leakage may result in potential impact to soils or groundwater	3	Small chemical inventory stored on site	1	Spill trays in chemical storage areas. Site drainage system will ensure no spillages can impact soils and groundwater.,	3
16	All buildings	Building Fire	Operation	Off site smoke	3	Short term air quality	1	Fire prevention policy and procedures	3

17.5 MITIGATION AND MONITORING MEASURES

The proposed power plant will be designed and constructed in line with good industry practice, and, as such, mitigation against the risk of major accidents and/or disasters will be embedded through the design and in accordance with planning and Industrial Emissions Licence requirements. Table 17-4 sets out the various mitigation and monitoring measures which will ensure this to be the case.

Table 17-4: Mitigation and Monitoring Measures

Reference	Potential Risks	Risk Score	Phase	Mitigation and Monitoring Measures	Outcome	Action
1	Extreme heat or cold weather	2	Construction / Operation / Decommissioning	The power plant will be constructed, operated and decommissioned in accordance with all relevant planning, building and environmental licencing codes.		Implementation of Planning Permission and IE Licence Conditions
2	Storm events	2	Construction / Operation / Decommissioning	As above		As above
3	Flooding	4	Construction / Operation / Decommissioning	None required.		None required
4	Pollution to soils / groundwater / surface waters	3	Construction / Operation / Decommissioning	Implementation of CEMP during Construction, EIAR and IE licence conditions during operations, and Decommissioning Management Plan during decommissioning	Potential for risk occurring is reduced significantly through the implementation of appropriate Mitigation Measures	Implementation of Planning Permission and IE Licence Conditions
5	Atmospheric emissions which exceed EPA Industrial Emissions Licenced parameters	4	Operation	Exhaust gases from the gas engines will be emitted to atmosphere through the exhaust stack. The stack will incorporate an in-situ proprietary Continuous Emission Monitoring System (CEMS). The selection, installation, calibration, ongoing quality assurance and annual surveillance testing of the CEMS will be undertaken in accordance with BAT.	As above	A Planned Preventative Maintenance Programme (PPMP) will be developed, in accordance with manufacturer's specifications, incorporating all abatement and control systems as well as plant, pipes, valves and flanges with a potential atmospheric emission source as deemed appropriate. All defects will be prioritised. Defects associated with health and safety and environmental equipment will be given highest priority and action will be taken immediately.

Reference	Potential Risks	Risk Score	Phase	Mitigation and Monitoring Measures	Outcome	Action
						Greener Ideas Limited will provide the results of the emissions monitoring to the EPA as directed in the Industrial Emissions License.
6	Leak of natural gas	4	Operation	The engine house will be fitted with pressure monitoring to detect a pressure drop and a gas detection system that will be interlocked with the plant control system	Potential for risk occurring is reduced significantly through the implementation of appropriate mitigation measures.	Planned Preventative Maintenance Programme (PPMP)
7	Leak of natural gas	4	Operation	As above	As above	As Above
8	Leak from the lubricating oil cooling system	4	Operation	The entire lubricating oil system will be subject to regular inspection and maintenance to avoid leaks.	As above	As above
9	Fire in a transformer resulting in emissions of combustion products	4	Operation	All transformers are fitted with protection systems to protect against faults and prevent explosion.	As above	As above
10	Low sulphur diesel oil spillages during tanker unloading/delivery operations	6	Operation	Where refuelling is to take place on site it will be in an impermeable bunded area which will be subject to regular inspection and integrity testing in accordance with Industrial Emissions licensing requirements.	As above	As above
11	Leaks	3	Operation	In order to prevent escape of liquid fuel oil, in the unlikely event of a catastrophic failure of the tanks, a secondary containment system in the form of a tank bund will be provided. The bund will be fitted with pumping facilities to enable drainage of collected surface water. The storm water will pass	As above	As above

Reference	Potential Risks	Risk Score	Phase	Mitigation and Monitoring Measures	Outcome	Action
				through a silt trap and hydrocarbon interceptor prior to discharge. The bund will be fitted with ramps to allow access by the emergency services and maintenance personnel. All tanks, bunds and pipe networks will be designed and tested in accordance with BAT.		
12	Catastrophic failure of storage tank	4	Operation	As Above	As above	As above
13	Tank fire or bund fire	4	Operation	In the improbable event of a major leak from the tank to the bund it is unlikely that this will lead to a fire as diesel has a flash point of greater than 55°C and is not classified as flammable. There will be no sources of ignition in the bund.	As above	As above
14	Failure of pipework	3	Operation	Pipes, bunds and storage facilities will be regularly checked for deterioration, damage and leaks. Integrity testing and the maintenance of all abatement, control and monitoring equipment will be incorporated into the onsite maintenance programmes.		
15	Leakage of chemical from storage containers or pipework	3	Operation	Conditioning chemicals will be stored relatively small quantities in a dedicated chemical storeroom within the water treatment plant which will be provided with appropriate ventilation and temperature control. Drums and IBC's will be stored on drip trays / spill pallets.	As above	As above

Reference	Potential Risks	Risk Score	Phase	Mitigation and Monitoring Measures	Outcome	Action
				The store will be enclosed and shall be capable of fully containing any spills within. A spill kit will also be located in close proximity to the chemical store. Only experienced and trained personnel will be permitted access to the chemical store on site. As required, conditioning chemicals will be transferred from the storeroom to the water treatment plant to replenish the dosing tanks. The transfer route will be kept clear of all obstacles to allow the safe transfer of chemicals. Dosing tanks will be fitted with level indicators and located within bunds. Transfer of chemicals will be undertaken by trained personnel only. The dosing tank level indicators and bunds will be subject to regular inspections. Cleaning products will be of a water based biodegradable nature wherever possible. Any hazardous cleaning products will be segregated in a locked cabinet with limited access to prevent misuse.		
16	Building Fire	3	Operation	Follow fire prevention policy procedures	As above	Fire prevention policy and procedures

17.6 CUMULATIVE EFFECTS

All of the risk scenarios identified in Tables 17.3 and 17.4 can be mitigated and monitored accordingly within the power plant site. No cumulative impacts outside of the site with other existing development, projects or plans are predicted.

17.7 RESIDUAL EFFECTS

As can be seen in Table 17.5 below, the residual risk of a major accident or disaster occurring during either the construction, operation or decommissioning phased of the project is either very low or low. It should be noted in this table that all risk scenarios identified in Tables 17.3 and 17.4 are listed.

Table 17-5: Overview of Potential Risk

Likelihood	Very High	5					
	High	4					
	Medium	3					
	Low	2		3, 5, 9,			
	Very Low	1		1, 2	4, 11, 14, 15, 16	6, 7, 12, 13,	
			1	2	3	4	5
			Trivial	Minor	Moderate	Major	Massive
	Consequence						