Chapter 13.0

Risk Management

13.0 Introduction

This chapter of the EIAR has been prepared by Ken Manley BE CEng MIEI FConsEI in consultation with other members of the design team. Ken is a company director and founding member of MHL and Associates Ltd. He is a member of the Institute of Engineers Ireland (IEI) and the Association of Consulting Engineers of Ireland (ACEI).

The 2014 EIA Directive (2014/52/EU) has updated the list of topics to be addressed in an EIAR and has included 'Risk Management' as a new chapter to be addressed. Article 3 of the new EIA Directive requires that the EIA shall identify, describe and assess in the appropriate manner, the direct and indirect significant effects on population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage, and landscape deriving from (amongst other things) the *"vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned".*

The Planning and Development Regulations 2001, as amended, Schedule 6 paragraph 2(h) indicate that it may be appropriate to furnish additional information in relation to the following –

> *(h) 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.*

This Chapter identifies and considers the likelihood and potential significant adverse effects on the environment arising from the vulnerability of the proposed development to risks of major accidents and/ or natural disasters.

To address unforeseen or unplanned effects Directive 2014/52/EU requires that an EIAR takes account of the vulnerability of the project to risk of major accidents and / or disasters relevant to the project concerned and that the EIAR therefore explicitly addresses this issue. The extent to which the effects of major accidents and / or disasters are examined in the EIAR should be guided by an assessment of the likelihood of their occurrence (risk). This may be supported by general risk assessment methods or by systematic risk assessments required under other regulations e.g. a COMAH (Control of Major Accident Hazards involving Dangerous Substances) assessment.

13.1 Methodology

It is important to note that the proposed development has been designed and will be constructed in accordance with best practice construction methods and guidelines and as such major accidents will be very unlikely.

The scope and methodology of this Chapter is based on the amended EIA Directive, the draft EPA Guidelines – Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2017), other published risk assessment guidance and on professional judgement.

A risk-analysis-based methodology, which covers the identification, likelihood and consequence of major accidents/ natural disasters has been used for the assessment.

With regard to the assessment of major accidents and natural disasters Directive 2014/52/EU is relevant as follows:

Recital 7 states that over the last decade, environmental issues, such as resource efficiency and sustainability, biodiversity protection, climate change, and risks of accidents and disasters, have become more important in policy making. They should therefore also constitute important elements in assessment and decision-making processes.

Recital 15 states:

> *"In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment. For such projects, it is important to consider their vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment. In order to avoid duplications, it should be possible to use any relevant information available and obtained through risk assessments carried out pursuant to Union legislation, such as Directive 2012/18/EU of the European Parliament and the Council (4) and Council Directive 2009/71/Euratom (5), or through relevant assessments carried out pursuant to national legislation provided that the requirements of this Directive are met"*

Article 3 states that 1- The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

(a) Population and human health;

(b) Biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;

(c) Land, soil, water, air and climate;

(d) Material assets, cultural heritage and the landscape;

(e) The interaction between the factors referred to in points (a) to (d).

And 2- The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned.

Annex IV of the Directive sets out the information relevant to major accidents and/or natural disasters to be included in the EIA report. Part 8 states:

"A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the

European Parliament and of the Council[1] or Council Directive 2009/71/Euratom[2] or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this 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 such emergencies".

The EPA Draft Guidelines on the Information to be contained in an EIAR refer to major accidents and/ or disasters in a number of sections. The Guidelines note that the key amendment introduced by the 2014 Directive include the refinement of environment factors to be considered in the assessment process – resource efficiency, climate change, population and human health, biodiversity and disaster risk prevention and management.

The Guidelines state that an EIA must include the expected effects arising from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project7 and where appropriate, the description of expected significant effects should include details of the preparedness for and proposed response to such emergencies.

It is notes that there are two key considerations, namely:

- The potential of the project to cause accidents and/or disasters, including implications for human health, cultural heritage, and the environment;

- The vulnerability of the project to potential disasters/accidents, including the risk to the project of both natural disasters (e.g. flooding) and man-made disasters (e.g. technological disasters).

These considerations are separate to any assessment of the project required under the Seveso III Directive which is likely to include a detailed risk assessment.

The Guidelines states that the project characteristics should include a description of the risk of accidents having regard to substances or technologies used. They also state that the impact assessment should include the risks to human health, cultural heritage or the environment (for example due to accidents or disasters).

The EPA Guidance on Assessing and Costing Environmental Liabilities 2014 has also been consulted. This guidance presents a systematic approach for assessing and costing environmental liabilities associated with closure and restoration/ aftercare and incidents.

A number of assessments also deal with the risk of accidents and natural disasters outside the EIA process. These include the Construction Environmental Management Plan (CEMP) and Flood Risk Assessment (FRA) which are submitted with this planning application. The relevant sections of the EIAR which include information on the CEMP and FRA are Chapters 5 and 6. The CEMP deals with risks associated with pollution during the construction of the proposed development.

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[1] Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations (OJ L 172, 2.7.2009, p. 18)

[2] Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations (OJ L 172, 2.7.2009, p. 18)

13.1.1 Site Specific Risk Assessment Methodology

The Site-Specific Risk Assessment identifies and quantifies risks associated with the construction and operation of the proposed development. It focuses on unplanned but possible events that could occur.

The impact ratings used in this assessment are taken from the Guide to Risk Assessment in Major Emergency Management (Department of the Environment, Heritage and Local Government, 2010).

13.1.2 Risk Identification, Likelihood and Consequence

The following steps were undertaken in this site-specific risk assessment:

- Risk identification
- Risk classicisation – likelihood and impact
- Risk evaluation

Risk Identification

Risks were identified through the consideration of risks that are abnormal but plausible in consultation with the relevant specialists within the design team.

Risk Classification – Likelihood

Risk classification relates to the likelihood of the risk occurring. The relevant safety procedures and environmental controls were considered when estimating the likelihood of the identified risks occurring. The impact and likelihood criteria at Table 13.1 are taken from the Guide to Risk Assessment in Major Emergency Management (Department of the Environment, Heritage and Local Government, 2010).

Table 13.1 Classification of Likelihood

Ranking	Classification	Likelihood
1	Extremely Unlikely	May occur only in exceptional circumstances; Once every 500 or more years
2	Very Unlikely	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or very few incidents in associated organisations, facilities or communicates; and / or little opportunity, reason or means to occur; May occur once every 100-500 years.
3	Unlikely	May occur at some time; and /or few, infrequent,

		random recorded incidents or little anecdotal evidence; some incidents in associated or comparable organisations worldwide; some opportunity, reason or means to occur; may occur once per 10-100 years.
4	Likely	Likely to or may occur; regular recorded incidents and strong anecdotal evidence and will probably occur once per 1-10 years
5	Very Likely	Very likely to occur; high level of recorded incidents and/ or strong anecdotal evidence. Will probably occur more than once a year.

Risk Classification – Impact

In considering the potential impact, it is relevant to take into account two factors – the type or nature of the impact and the scale. The type or nature of the impact may be considered in three fields as follows:

- Impact on life, health and residual welfare of a community
- Social/environmental impact. Social impact may be thought of in terms of disruption/displacement of people affected by the event, while environmental impact is the impact on the physical area;
- Economic impact in terms of costs of property/ infrastructure damage as well as recovery costs or loss of economic production.

It should be noted that when categorising the consequence rating, the rating assigned assumes that all proposed mitigation measures and safety procedures have failed to prevent the major accident/ or disaster. The classification of impact has been determined using Table 13.2.

Table 13.2 Classification of Impact

Ranking	Classification	Impact	Description
1	Minor	Life, Health, Welfare, Environment, Infrastructure, Social	Small number of people affected; no fatalities and small number of minor injuries with first aid treatment.

			No contamination, localised effects Infrastructure <0.5M Euros Minor localised disruption to community services or infrastructure (<6 hours).
2	Limited	Life, Health, Welfare, Environment, Infrastructure, Social	Single fatality; limited number of people affected; a few serious injuries with hospitalisation and medical treatment required. Localised displacement of a small number of people for 6-24 hours. Personal support satisfied through local arrangements. Simple contamination, localised effects of short duration 0.5-3M Euros Normal community functioning with some inconvenience.
3	Serious	Life, Health, Welfare, Environment, Infrastructure, Social	Significant number of people in affected area impacted with multiple fatalities (<5), multiple serious or extensive injuries (20), significant hospitalisation. Large number of people displaced for 6-24 hours or possibly beyond; up to 500 evacuated. External resources required for personal support. Simple contamination, widespread effects or extended duration 3-10M Euros Community only partially functioning, some services available.
4	Very serious	Life, Health, Welfare,	5 to 50 fatalities, up to 100 serious injuries, up to 2000 evacuated

		Environment, Infrastructure, Social	Heavy contamination, localised effects or extended duration 10-25M Euros Community functioning poorly, minimal services available
5	Catastrophic	Life, Health, Welfare, Environment, Infrastructure, Social	Large numbers of people impacted with significant numbers of fatalities (>50), injuries in the hundreds, more than 2000 evacuated. Very heavy contamination, widespread effects of extended duration. >25M Euros Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support.

In addition Cork City Council have a Major Emergency Plan in place – *Cork City Council Major Emergency Plan 2017.* The major emergency plan is the combined and coordinated plans of Cork City Council, the Health Service Executive and An Garda Siochána in the event of a major emergency occurring within Cork City Council functional area. The plan outlines generally the procedure to be followed and the functions to be undertaken by Cork City Council and to coordinate the procedures to be followed and functions to be undertaken by Cork City Council with those of the Health Service Executive, An Garda Siochána and other agencies responding to the emergency. The objective of the plan is to protect life and property, to minimise disruption to the area, and to provide immediate support for those affected.

Risk Evaluation

The likelihood and consequence ratings are multiplied to form a risk score for risk evaluation. A risk matrix can be prepared against which the proposed development can be tested. An example of a risk matrix is shown at Table 13.3.

Table 13.3 Risk Matrix

Likelihood Rating							
	Very likely	5					
	Likely	4					
	Unlikely	3					
	Very unlikely	2					
	Extremely Unlikely	1					
			Minor	Limited	Serious	Very Serious	Catastrophic
			1	2	3	4	5
			Consequence Rating				

Risk Identification

The site is not in an area prone to natural disasters. Risk registers have been developed which contain the most relevant risks that have been identified for the proposed development. There are set out below.

13.2 Receiving Environment

The surrounding site context consists of a mix of residential and agricultural development. Ireland's geographical location means that it is generally less vulnerable to natural disasters such as earthquakes and hurricanes which pose risks in other countries. There has however been an increase in more severe weather events in recent years which have resulted in severe weather conditions. Examples include Storm Ophelia in 2017 and Storm Emma in 2018. The Cork City Major Emergency Plan was activated during these weather events.

Other incidents in Cork that have resulted in the activation of the emergency plan include a multi vehicle road traffic collision involving a bus and several cars, the Buttevant train crash, Bantry Bay oil tanker, Cork airport crash, the Air India plane crash, the Hicksons chemical plant fire and Corden pharmaceuticals.

A number of risk assessments have been carried out in the Cork region identifying twenty risks within the functional area which had various implications for Cork City Council and which required planning and preparedness. The Cork City Council Risk Assessment process recorded some examples of site/ department specific emergency plans for facilities in the city. These include:

- Cork Airport interagency emergency plan
- Port of Cork emergency management plan
- Jack Lynch Tunnel interagency emergency plan
- Kent Rail Tunnel interagency emergency plan
- On site and external emergency plans for Seveso Sites
- Event plans for major events in the city
- National plans – Avian Flu
- Emergency plans in place within various directorates/ departments of Cork City Council

The European Communities (Control of Major Accident Hazards involving Dangerous Substances) Regulations, 2015 (SI 209 of 2015) implement the requirements of the Council Directive 2012/18/EU on the control of major accident hazards involving quantities to take all measures necessary to prevent and mitigate the effects of major accidents to man and the environment. Establishments which fall under the remit of the Seveso III Regulations are classified as either “lower tier” or “upper tier” sites. There are five Seveso sites within the Cork City functional area - Gouldings Chemicals Ltd (Lower Tier); Flogas Ireland Ltd (Upper Tier); Calor Teorants (Upper Tier); Chemicals Bulk Storage Ltd (Lower Tier) and Grasslands Agro (Lower Tier). The nearest facility to the proposed development is Gouldings Chemicals Ltd which is approximately 5.5 km to the south of the proposed development. The proposed development is not within the consultation distance for Goulding Chemicals Ltd.

Objective 12.23 of the Cork City Development Plan 2015 states the local authority are actively seeking to relocate these facilities to alternative sites outside of the city.

13.3 Potential Impact of the Proposed Development

13.3.1 Do Nothing Scenario

In the do-nothing scenario, any significant adverse effects the proposed development would have on the environment due to its vulnerability to major accidents and/or disaster would be eliminated and the site would remain the same as it is currently, reflecting existing agricultural use.

13.3.2 Construction Phase

It is considered that the main risks associated with the proposed development will arise during the construction phase. The potential direct and indirect risks associated with the construction stage of the proposed development are contained in the risk register in Table 13.4. MHL Consulting Engineers have carried out a Design Risk Assessment as part of the design process, with the aim of reducing risk through design, for the proposed scheme. The findings of this assessment have informed the scheme layout and will be further developed prior to the construction stage.

Table 13.4 Construction Stage Risk Register

Category	Risk Factor Type	Likelihood
Weather	Extreme weather events including storms, snow affecting construction/ infrastructure.	4
Construction accident	Construction vehicle collision with car, pedestrian/cyclist; accident when working, all site associated risks both to workers and the general public.	3
Industrial accident	Not proximate to Seveso site	1
Fire / explosion	Construction vehicle or machinery collision; ignition of fuel or other substances on site; strike to underground services	3
Structural damage	Caused by vibrations from machinery/ works on site	3
Pollution / hazardous substance escape	Surface or ground water pollution due to accidental spillages or fuel leaks from construction vehicles	3

13.3.3 Operational Phase

The direct and indirect risks associated with the operation stage of the proposed development are contained in the risk register in Table 13.5.

Table 13.5 Operation Stage Risk Register

Category	Risk Factor Type	Likelihood
Weather	Risk to life due to extreme weather events including storms, snow	4
Road accident	Collision with car, pedestrian/cyclist	3
Industrial accident	Not proximate to Seveso site	1
Fire / explosion	Electrical faults/ use of flammable/ combustible materials	3
Accidents on site	Maintenance: Falls i.e. when window cleaning, maintenance of attenuation tanks etc.	3
Crime	Robbery or assault	3
Structural failure	Building collapse	2
Pollution of watercourses	Equipment failure or power outage leading to uncontrolled discharge from foul sewer network	3

13.4 Risk Assessment

Table 13.6 categorises each of the identified potential risks by their risk score. A corresponding risk matrix is provided below, which is colour coded, the red zone represents 'high risk scenarios', the amber zone represents 'medium risk scenarios' and green represents 'low risk scenarios'.

Table 13.6 Risk Assessment

Risk ID/ Potential Risk	Likelihood Rating	Consequence Rating	Risk Score
A. Extreme weather events including storms, snow affecting construction/ infrastructure	4	2	8
B. Construction vehicle collision with car, pedestrian/cyclist; accident when working	3	2	6
C. Industrial accident during construction	1	1	1
D. Construction vehicle or machinery collision; ignition of fuel or other	3	3	9

substances on site; strike to underground services			
E. Structural damage caused by vibrations from machinery/ works on site	3	2	6
F. Surface or ground water pollution due to accidental spillages or fuel leaks from construction vehicles	3	2	6
G. Risk to life due to extreme weather events resulting in flooding	4	2	8
H. Collision with car, pedestrian/cyclist	3	2	6
I. Industrial accident once operational	1	1	1
J. Electrical faults/ use of flammable/ combustible materials	3	3	9
K. Maintenance related incidents	3	2	6
L. Robbery or assault	3	2	6
M. Building collapse	2	5	10
N. Equipment failure or power outage leading to uncontrolled discharge of foul to surface water	3	3	9

Likelihood Rating	**Very Likely**	5					
	Likely	4		**A,G**			
	Unlikely	3		**B, E, F,H,K,L**	**D, J,N**		
	Very Unlikely	2					**M**
	Extremely Unlikely	1	**C, I**				
Classifictaion of Impact			**Minor** **1**	**Limited** **2**	**Serious** **3**	**Very Serious** **4**	**Catastrophic** **5**

13.5 Mitigation Measures

13.5.1 Construction Stage

A Construction Environmental Management Plan for the construction period accompanies this planning application. The CEMP identifies the environmental considerations associated with the construction process and outlines proposed work practices, management, mitigation and monitoring strategies to ensure the project is carried out in accordance with best practice, minimum impact on the surrounding environment and maximum safety throughout the duration of the scheme.

The CEMP will be a live document during the construction period and continuously updated to ensure that potential risks of major accidents and/or disasters are identified, avoided and mitigated as necessary.

13.5.2 Operation Stage

The proposed development will be built in accordance with best international current practice and as such mitigation against the risk of major accidents and or disasters will be embedded throughout the design stage. For example, emergency measures will be provided for the pumping station on the Ballyhooly Road which may include a generator to manage outages. On site boundary treatments will also be designed so as to prevent surface water flows from the pumping station to the adjacent watercourses and the proposal will be designed and engineered to be sealed so as to prevent ground water infiltration to the pumping station

In addition, under the provisions of the Building Control Regulations 2006 – 2018, each separate building is to be the subject of a separate Fire Safety Certificate Application. The applications for the Fire Safety Certificates will be submitted to the Local Authority Fire Department and each application will be accompanied by a fire safety compliance report and fire safety compliance drawings. The reports and drawings will demonstrate in detail how each building is to comply with Part B (Fire) of the Building Regulations 2006 – 2018. All areas of the overall development are to be provided with a number of active fire protection systems as part of the fire safety strategy. Full details of these will be set out in the compliance report submitted with the application for the Fire Safety Certificate.

The following is a summary in this regard;

i) Apartment Blocks associated with N6 are to be provided with sprinkler protection coverage under the provisions of BS 9991: 2015.The system is to be a domestic type system complying with BS 9251: 2014 (Category 2 type system) or a commercial system complying with BS EN12845: 2015.

ii) Each area of the development will be provided with a comprehensive common automatic fire detection and alarm system that is compliant with IS 3218: 2013. The system will provide Type L2/L3x automatic detection coverage throughout the development.

iii) In addition to the provision of a common fire alarm system, each dwelling is to be provided with a domestic fire alarm system that is compliant with BS 5839: Part 6: 2019. The domestic systems will be Grade D type systems providing at least Type LD2 detection/alarm coverage.

iv) The common areas of the development are to be provided with emergency lighting systems that provide coverage to all common circulation areas, non-residential rooms and the areas outside final exits. The system will be compliant with IS 3217: 2013 + A1: 2017.

v) Maintained illuminated Exit signs will be provided at all storey and final exits serving the building. These will be supplemented by additional Exit signs and directional Exit signs to ensure that all exits and escape routes are readily apparent to the building occupants. These signs will be of a type complying with BS 5499: Part 1: 2002.

vi) All common routes of escape will comply with the general fire protection features set out in Section 1.4 of Technical Guidance Document B.

vii) The covered carpark associated with N6 is to be provided with adequate levels of permanent natural ventilation. The ventilation is to equate to at least 2.5% of the carpark floor area. The ventilation is to be arranged so as to ensure cross-ventilation and a through flow of air will occur. This will be achieved by the provision of permanent openings strategically located around the perimeter of the carpark and on the roof.

13.6 Monitoring

Aside from the monitoring measures to be carried out by the contractor, as outlined in the CEMP and throughout the EIAR, no additional monitoring is considered necessary during the construction phase of the proposed development.

No additional monitoring is considered necessary during the operational phase of the proposed development.

13.7 Residual Impacts

Through the implementation of mitigation measures, there are no identified major accidents and or natural disasters that present a sufficient combination of risk and consequence that would lead to significant residual impacts or environmental effects.

13.8 Cumulative Impacts

A number of local developments and plans\ as identified in Chapter 2 of this EIAR have the potential to give rise to cumulative adverse effects on the environment as a result of a major accident and/ or disaster. The potential for the accident scenarios considered in this chapter affecting these other projects was considered, and the overall conclusions regarding risk and consequence remains as described in the detailed risk score tables.

13.9 References

- Directive 2014/52/EU of the European Parliament and the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment
- Department of Defence *A National Risk Assessment for Ireland* 2017
- DHPLG: *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* 2018

- DOELG: *A Framework for Major Emergency Management Guidance Document 1: A Guide To Risk Assessment In Major Emergency Management* 2010
- Department of the Taoiseach *National Risk Assessment Overview of Strategic Risks* 2017
- EPA: *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* 2017
- EPA: *Guidance on Assessing and Costing Environmental Liabilities* 2014
- The Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the "COMAH Regulations
- Cork City Council Major Emergency Plan 2017
- Cork City Development Plan 2015