

## 19 Major Accidents and Natural Disasters

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### 19.1 Introduction

This chapter describes likely significant negative effects on the environment arising from the vulnerability of the proposed development to risks of major accidents and/or natural disasters.

The assessment of the vulnerability of the proposed development to major accidents and natural disasters is carried out in compliance with the EIA Directive which 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 underlying objective of this assessment is to ensure that appropriate precautionary actions are taken for those projects which *“because of their vulnerability to major accidents and/or natural disasters, are likely to have significant adverse effects on the environment”*.

Based on the requirements of the EIA Directive, this chapter seeks to determine:

- The relevant major accidents and/or natural disasters, if any, that the proposed development could be vulnerable to;
- The potential for these major accidents and/or natural 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.

### 19.2 Assessment Methodology

#### 19.2.1 General

The scope and methodology of this assessment is centred on the understanding that the proposed development will be designed, built and operated in line with best international current practice. As such, major accidents resulting from the proposed development will be very unlikely.

The scope and methodology presented in the following sections is based on the provisions of the EIA Directive, the draft EPA Guidelines<sup>1</sup>, EU Commission guidance<sup>2</sup> and other published risk assessment methodologies as described in **Section 19.2.4.2** and professional judgement.

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<sup>1</sup> EPA (2017) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports: Draft, August 2017.

<sup>2</sup> European Commission (2017) Environmental Impact Assessment of Projects- Guidance on the preparation of the Environmental Impact Assessment Report

A risk analysis based methodology that covers the identification, likelihood and consequence of major accidents and/or natural disasters has been used for this assessment (Refer to **Section 19.2.4** for further detail on this approach).

Major accidents or natural disasters are hazards that have the potential to affect the proposed development. These include accidents during construction and operation caused by operational failure and/or natural hazards. The assessment of the risk of major accidents and/or disaster considers all factors defined in the EIA Directive that have been considered in this EIAR, i.e. population and human health, biodiversity, land, soil, water, air and climate and material assets, cultural heritage and the landscape.

## 19.2.2 Guidance and Legislation

### 19.2.2.1 Legislative Requirements

The following paragraphs set out the requirements of the EIA Directive in relation to major accidents and/or natural disasters.

Recital 15 of the EIA Directive states that:

*“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<sup>3</sup> and Council Directive 2009/71/Euratom<sup>4</sup>, or through relevant assessments carried out pursuant to national legislation provided that the requirements of this Directive are met.”*

It is clear from the EIA Directive that a major accident and/or natural disaster assessment should be mainly applied to ‘Control of Major Accident Hazards involving Dangerous Substances’ (COMAH)<sup>5</sup> sites or major industrial/energy installations. Notwithstanding, the assessment of major accidents and natural disasters for the proposed development has been carried out for completeness given the strategic nature and importance of the proposed development for Arklow town.

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<sup>3</sup>Directive 2012/18/EU of the European Parliament and the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC (OJ L 197, 24.7.2012, p. 1).

<sup>4</sup> 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).

<sup>5</sup> Control of Major Accident Hazards Involving Dangerous Substances Regulations 2006, as amended (S.I. No. 209 of 2015), implementing the Seveso II Directive (96/82/EC)

Article 3 of the EIA Directive requires that the EIAR 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 information relevant to major accidents and/or disasters to be included in the EIAR is set out in Section 8 of Annex IV of the EIA Directive as follows:

*“(8) 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 or Council Directive 2009/71/Euratom 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”.*

### 19.2.2.2 Guidance Documents

A number of guidance documents and published plans have been reviewed and considered in order to inform this assessment, as described in the following sections.

#### **Environmental Impact Assessment of Projects- Guidance on the preparation of the Environmental Impact Assessment Report**

The European Commission Guidance<sup>2</sup> outlines the legislative requirements and key considerations which should be taken into account in the preparation of EIARs with respect to accident and disaster risks.

The Guidance lists the following issues which EIARs should address:

- What can go wrong with a Project?
- What adverse consequences might occur to human health and to the environment?
- How likely are these consequences?
- What is the Project’s state of preparedness in case of an accident/disaster?
- Is there a plan for an emergency situation?

#### **Draft EPA Guidelines**

The draft EPA guidelines<sup>1</sup> refer to major accidents and/or disasters in a number of sections including:

- Characteristics of the Project – The draft EPA guidelines<sup>1</sup> state under Section 3.5.2 that the project characteristics should include “*a description of the Risk of Accidents – having regard to substances or technologies used.*”
- Impact assessment - The draft EPA guidelines<sup>1</sup> state under Section 3.7.1 that the impact assessment should, in accordance with Annex IV(5) of the EIA Directive, include “*the risks to human health, cultural heritage or the environment (for example due to accidents or disasters).*”
- Likelihood of Impacts - The draft EPA guidelines<sup>1</sup> state the following under Section 3.7.3:

*“To address unforeseen or unplanned effects the Directive further requires that the 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.”*

### **Guidance on Assessing and Costing Environmental Liabilities**

The EPA guidance document<sup>6</sup> above presents a systematic approach for assessing and costing environmental liabilities associated with closure, restoration/aftercare and incidents. This guidance is targeted at activities falling under the various EPA authorisation regimes including the Industrial Emissions Directive (IED), Integrated Pollution Prevention and Control (IPPC), wastewater discharge authorisations (WWDA) and dumping at sea (DaS).

This document<sup>6</sup> provides guidance on the identification and quantification of risks, focusing on unplanned, but possible and plausible events that may occur during the construction and operational phases of licensed facilities and/or activities. Specifically, guidance is also provided on a range of risk assessment and evaluation techniques in Section 3.3 of the draft EPA guidance<sup>6</sup>.

### **A Framework for Major Emergency Management Guidance Document 1-A Guide to Risk Assessment in Major Emergency Management**

The Department of the Environment, Heritage and Local Government, as it then was, published a guidance note<sup>7</sup> in January 2010 on best practice in the area of risk assessment for major emergency management.

The document<sup>7</sup> provides guidance on the various stages of the risk assessment process and how it should be employed to inform mitigation and detailed planning during major emergency situations. Part 1 of the guidance<sup>7</sup> defines criteria for classifying impact and likelihood scenarios in order to support the risk assessment process, as well as a process for recording the risk assessment.

<sup>6</sup> EPA (2014) Guidance on Assessing and Costing Environmental Liabilities

<sup>7</sup> DoEHLG (2010) A Guide to Risk Assessment in Major Emergency Management

## A National Risk Assessment for Ireland 2017

The most recent National Risk Assessment<sup>8</sup> forms a critical subset of the strategic process (‘National Risk Assessment: Overview of Strategic Risks’) undertaken by the Government on an annual basis to assess national risks. The purpose of the assessment is to identify national hazards across a broad range of emergencies, to assess the likelihood and impact of these risks and to inform actions at national level aimed at mitigating such risks, including the allocation of resources.

### Major Emergency Plan for Wicklow

This plan<sup>9</sup> for Wicklow County Council has been prepared in accordance with the requirements of the Government and is consistent with the Government issued guidance<sup>10</sup>.

The objective of this Plan<sup>9</sup> is to protect life and property, to minimize disruption to the County of Wicklow, and to provide immediate support for those affected. To achieve these objectives, the Plan<sup>9</sup> sets out the basis for a coordinated response to a major emergency and lays down the different roles and functions to be performed by Wicklow County Council and by the Principal Response Agencies (agencies designated by Government to respond to Major Emergencies).

### 19.2.3 Categorisation of the Baseline Environment

A desk-based study has been undertaken in order to establish the baseline environment on which the risk assessment is being carried out, as this will influence both the likelihood and the impact of a major accident and/or natural disaster.

As outlined in the guidance<sup>7</sup>, establishing the local and regional context prior to completion of the risk assessment enables a better understanding of the vulnerability and resilience of the area to emergency situations. **Section 19.3** provides an overview of the baseline environment that has been considered for this assessment.

### 19.2.4 Impact Assessment Methodology

#### 19.2.4.1 Current Practice

As discussed above, the scope and methodology of this assessment is centred on the understanding that the proposed development will be designed, built and operated in line with best international current practice and, as such, the vulnerability of the proposed development to risks of major accidents and/or natural disasters is considered low.

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<sup>8</sup> Department of Defence (2017) A National Risk Assessment for Ireland 2017

<sup>9</sup> Wicklow County Council (2017) Major Emergency Plan

<sup>10</sup> Government of Ireland (2006) A Framework for Major Emergency Management

Current EIA practice already includes an assessment of some potential accidents and disaster scenarios such as pollution incidents to ground and watercourses as well as assessment of flooding events. These are described in detail in the relevant EIAR assessment chapters (Refer to **Chapters 14 and 15** for further detail).

#### 19.2.4.2 Site-Specific Risk Assessment Methodology

##### Overview

A 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 development. The approach to identifying and quantifying risks associated with the proposed development by means of a site specific risk assessment is derived from the EPA guidance<sup>6</sup>.

The criteria for categorising impact is derived from the DoEHLG guidance<sup>7</sup> (Refer to Table 19.1 and Table 19.2).

The following steps were undertaken as part of the site-specific risk assessment:

- Risk identification;
- Risk classification, likelihood and consequence; and
- Risk evaluation.

##### Risk Identification

Risks have been reviewed through the identification of plausible risks in consultation with relevant specialists. The identification of risks has focused on non-standard but plausible incidents that could occur at the proposed development during construction and operation.

In accordance with the European Commission Guidance<sup>2</sup>, risks are identified in respect of the projects:

- (1) Potential vulnerability to disaster risks; and
- (2) Potential to cause accidents and/or disasters.

##### Risk Classification

###### *Classification of Likelihood*

Having identified the potential risks, the likelihood of occurrence of each risk has been assessed. An analysis of safety procedures and proposed environmental controls was considered when estimating likelihood of identified potential risks occurring. Table 19.1 defines the likelihood ratings that have been applied.

The approach adopted has assumed a 'risk likelihood' where one or more aspects of the likelihood description are met, i.e. any risk to the proposed development less than extremely unlikely to occur has been excluded from the assessment.

Table 19.1: Risk Classification Table - Likelihood (Source DoEHLG7)

Ranking	Likelihood	Description
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 communities; 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 organisation's 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.

### *Classification of Consequence*

The consequence rating assigned to each risk has assumed that all proposed mitigation measures and/or safety procedures have failed to prevent the major accident and/or disaster. Further the Wicklow County Council Major Emergency Plan<sup>9</sup>, if implemented as intended, would work to reduce the consequence of any major accident or disaster. The consequence of the impact if the event occurs has been assigned as described in Table 19.2.

The consequence of a risk to/from the proposed development has been determined where one or more aspects of the consequence description are met, i.e. risks that have no consequence have been excluded from the assessment.

Table 19.2: Risk Classification Table – Consequence (Source DoEHLG7)

Ranking	Consequence	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 <€0.5M 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 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 Community only partially functioning, some services available.
4	Very Serious	Life, Health, Welfare Environment Infrastructure Social	5 to 50 fatalities, up to 100 serious injuries, up to 2000 evacuated Heavy contamination, localised effects or extended duration €10-25M 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 Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support.



## Risk Evaluation

Once classified, the likelihood and consequence ratings have been multiplied to establish a ‘risk score’ to support the evaluation of risks by means of a risk matrix.

The risk matrix sourced from the DoEHLG<sup>7</sup> guidance and as outlined in Table 19.3) indicates the critical nature of each risk. This risk matrix has therefore been applied to evaluate each of the risks associated with the proposed development. The risk matrix is colour coded to provide a broad indication of the critical nature of each risk:

- The red zone represents ‘high risk scenarios’;
- The amber zone represents ‘medium risk scenarios’; and
- The green zone represents ‘low risk scenarios’.

Table 19.3: Risk Matrix (Source DoEHLG7)

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

## 19.3 Baseline Conditions

### 19.3.1 Natural Disasters

Ireland’s geographic position means it is less vulnerable to natural disasters such as earthquakes or tsunamis, which might pose risk to projects of this nature and scale in other locations. However, in recent times there has been an increase in the number of severe weather events in the country, particularly those leading to flooding and flash flood incidents.

Severe weather conditions in 1986, 1989, 2000 and 2004 for example, caused severe flooding in Arklow town, primarily in the Lower Main Street, South Quay and Ferrybank areas. With regards natural disasters, severe weather conditions pose one of the most common risks to Ireland and to the proposed development.

### 19.3.2 Major Accidents

There are two Industrial sites within Arklow, which are subject to Industrial Emissions Directive (‘IE’) Licences from the EPA:

- Avoca River Park Limited – located upstream of the proposed development adjacent to the Avoca River; and

- Sigma-Aldrich Ireland Limited – located on Vale Road adjacent to the M11 flyover and close to the Avoca River.

The Sigma Aldrich facility is also designated as a 'Seveso site', in accordance with Council Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances. This classification as a 'Seveso site' identifies the facility as an industrial establishment where dangerous substances are used or stored in large quantities. The occurrence of a major emission, fire or explosion resulting from a Seveso site has the potential to give rise to a major accident or disaster, immediate or delayed, inside or outside the establishment, and involving one or more dangerous substances.

## 19.4 Likely Significant Effects

### 19.4.1 Do Nothing Scenario

In the do-nothing scenario, the potential risk of the proposed development causing, or being affected by a disaster and/or accident would be eliminated as the proposed Arklow Wastewater Treatment Project would not be implemented.

### 19.4.2 Assessment of Effects during Construction

Two risks specific to the construction of the proposed development have been identified. These are outlined in the Construction Risk Register in Table 19.4.

Table 19.4: Risk register - construction

Risk ID	Potential Risk	Possible cause
Potential vulnerability to disaster risks		
A	Flooding of WwTP site during the construction of the replacement revetment or flooding of working areas during the construction of the interceptor sewers.	Extreme weather- periods of heavy rainfall, taking into account climate change, strong winds and tidal events
Potential to cause accidents and / or disasters.		
B	Bridge collapse	Structural collapse of bridge arches during underpinning works

### 19.4.3 Assessment of Effects during Operation

Six risks specific to the operation of the proposed development have been identified. These are outlined in the Operation Risk Register in Table 19.5.

Table 19.5: Risk register - operation

Risk ID	Potential Risk	Possible cause
Potential vulnerability to disaster risks		
C	Flooding of WwTP resulting in uncontrolled releases of untreated wastewater into the Avoca River or Irish Sea	Extreme weather- periods of heavy rainfall, taking into account climate change, strong winds and tidal events
D	Incident at nearby SEVESO site resulting in off-site environmental impact	Fire/Explosion; and Equipment /Infrastructure failure
Potential to cause accidents and / or disasters.		
E	Discharge, spillage or longer-term seepage of untreated wastewater, fuel, chemicals solvents etc. into watercourse or groundwater table	Equipment and power failure; Failure of, or damage to WwTP infrastructure or inlet works; Fuel spillage during tanker unloading/ delivery operations; Loss from above-ground tanks/ pipelines, discharge to surface water; and Flooding of site resulting in uncontrolled discharge.
F	Fire/Explosion	Equipment or infrastructure failure; Electrical problems; and Employee negligence.
G	Collapse/ damage to structures	Earthquakes; and Vehicular collisions.
H	Vehicle collisions on site	Employee negligence; and Failure of vehicular operations.

These risks have been assessed in accordance with the relevant classification (Refer to Table 19.1 and Table 19.2) and the resulting risk analysis is given in Table 19.6.

The risk register is based upon possible risks associated the proposed development. As outlined in **Section 19.2.4.2**, the consequence rating assigned to each potential risk assumes that all proposed mitigation measures and safety procedures have failed to prevent the major accident and/or disaster.

Table 19.6: Risk assessment

Risk ID	Potential Risk	Possible cause	Environmental effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
<b>Construction</b>								
Potential vulnerability to disaster risks								
A	Flooding of WwTP site during the upgrade of the revetment, or flooding of working areas during the construction of the interceptor sewers.	Extreme weather-periods of heavy rainfall, taking into account climate change, strong winds and high tide	Sedimentation of the Avoca River or Irish Sea, Damage to, or depletion of aquatic habitats and species; Potential flooding of properties	2	The risk of flooding during the construction of the revetment is considered very unlikely. As outlined in <b>Chapter 5</b> , the removal of the existing rock revetment and construction of the replacement will be carried out in a staged process along the revetment in sections of approximately 15 to 25m. By using this method, the section under construction can be quickly protected during storm events and thus flood risk for the WwTP site will be minimised during the upgrade.	2	The risk of flooding during the construction of the revetment will result in a limited consequence in that there would be 'a limited number of people affected' with 'localised effects of short duration.' Further, there will be 'normal community functioning' in Arklow with 'some inconvenience'  The 'generic command, control & co-ordination systems' as well as the 'common elements of response' detailed in the Wicklow County Council Major Emergency Plan will work to reduce the consequence of potential flood events during construction.	4
Potential to cause accidents and / or disasters.								
B	Arklow Bridge collapse	Structural collapse of the bridge arches during underpinning works	Injury or loss of life.	1	Standard best practice construction measures will be implemented by the contractor during construction. The risk of bridge collapse during the underpinning of Arklow Bridge is considered extremely unlikely in that it 'may occur only in exceptional circumstances'	2	In the event of the collapse of Arklow Bridge, a limited consequence is envisaged in that a 'limited number of people' will be affected, with 'a few serious injuries.' There will also be 'localised displacement of a small number of people for 6-24 hours, with normal community	2

Risk ID	Potential Risk	Possible cause	Environmental effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
							<p>functioning with some inconvenience’.</p> <p>As outlined in <b>Chapter 5</b>, the bridge works will likely to be undertaken during night time. As such, there will be limited risk of pedestrians or vehicles being on the bridge deck in the event of a collapse.</p> <p>The ‘generic command, control &amp; co-ordination systems’ as well as the ‘common elements of response’ detailed in the Wicklow County Council Major Emergency Plan will work to reduce the consequence of potential bridge collapse during construction.</p>	
<b>Operation</b>								
Potential vulnerability to disaster risks								
C	Flooding of WwTP resulting in uncontrolled releases of untreated wastewater into the watercourse or sea	Extreme weather-periods of heavy rainfall, taking into account climate change, strong winds and tidal events.	Damage to, or depletion of aquatic life; and Illness or loss of life.	2	<p>As described in Chapter 3 ‘<i>Alternatives</i>’, a Flood Risk Assessment was carried out for the proposed development site. This study concluded that, while portions of this land are within flood zones A or B, they are well protected by an existing flood defence embankment.</p> <p>Further, Wicklow County Council and the OPW are currently in the process of developing the Arklow Flood Relief Scheme, which will</p>	2	<p>The potential flooding of the WwTP site will result in a limited consequence, in that a limited number of people will be affected, and there will be localised effects of a short durations.</p> <p>The ‘generic command, control &amp; co-ordination systems’ as well as the ‘common elements of response’ detailed in the Wicklow County Council Major Emergency</p>	4

Risk ID	Potential Risk	Possible cause	Environmental effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
					<p>be in part incorporated into the design and construction of the proposed development (i.e the upgraded revetment works). The Arklow FRS will be designed to withstand a 1 in 100-year flood event from the Avoca River as well as 1 in 200 year tidal flooding.</p> <p>Thus, the risk of flooding is predicted to be 'very unlikely.'</p>		Plan will work to reduce the consequence of potential flood events during operation.	
D	Incident at nearby Industrial Emission Directive (IED) licenced site/ SEVESO site resulting in off-site environmental impact	Fire /Explosion; and Equipment/ Infrastructure failure	Illness or loss of life; Damage to, or depletion of habitats and species; and Impacts on ambient air quality.	1	<p>The closest licensed site to the proposed development is a 'Seveso site' - the Sigma Aldrich facility at Vale Road, Arklow. Having regards to the sites Annual Environmental Reports (AER's) for the previous 5 years, it can be determined that any incidents that have been reported at the site in previous years have been minor in nature.</p> <p>The possibility of an incident occurring that will result in a significant negative impact on the proposed development, resulting in a major accident and/or disaster is considered 'extremely unlikely' in that it 'may occur only in exceptional circumstances; once every 500 or more years'</p> <p>The Sigma Aldrich facility is a lower tier Seveso site and</p>	4	According to the Health and Safety Authority, ' <i>major industrial accidents involving dangerous substances pose a significant threat to humans and the environment; such accidents can give rise to serious injury to people or serious damage to the environment, both on and off the site of the accident. In Europe, a catastrophic accident in the Italian town of Seveso in 1976 prompted the adoption of legislation on the prevention and control of such accidents</i> '.	4

Risk ID	Potential Risk	Possible cause	Environmental effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
					<p>COMAH requires them to prepare an Internal Emergency Plan which details both the systems that exist to deal with various emergencies and the response expected</p> <p>The site is also required to prepare a safety report and major accident prevention policy, and is subject to regular inspections from the Health and Safety Authority.</p> <p>According to the sites Environmental Liabilities Risk Assessment, the facility is well managed in terms of environmental controls. Risks that were identified as ‘high severity’ risks were identified to occur on a low to infrequent basis as a result of the management and design of the site, thus resulting in an overall low risk score.</p> <p>Having regard to the mechanisms in place to mitigate and avoid any major accident or incident at the Sigma Aldrich site, the comprehensive range of emergency response procedures in place in the event of these occurring, as well as the outcome of the sites ELRA, it is considered that the likelihood of a major incident occurring at the Sigma Aldrich facility which will significantly impact the proposed</p>			

Risk ID	Potential Risk	Possible cause	Environmental effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
					development will be very unlikely.'			
Potential to cause accidents and / or disasters.								
E	Discharge, spillage or longer-term seepage of untreated wastewater, fuel, chemicals solvents etc into watercourse or groundwater table	Equipment failure; Failure of, or damage to WwTP infrastructure or inlet works; Fuel spillage during tanker unloading/delivery operations; Loss from above-ground tanks/ pipelines, discharge to surface water; Power failure; and Flooding of site resulting in uncontrolled discharge.	Damage to, or depletion of aquatic habitats and species; and Illness or loss of life.	3	The risk of discharge of untreated wastewater into the Avoca River, Irish Sea or groundwater table is considered to be unlikely in that the instance 'may occur at some time' with 'few, infrequent, random recorded incidents.'  As outlined in <b>Chapter 4</b> , diesel will be stored on-site in a bunded area to ensure containment and prevent spillages of fuel. No fuels, chemicals or solvents will be stored outside of the confines of the WwTP buildings.	2	Should untreated wastewater be discharged into the watercourse or sea, a limited impact is predicted in that the incident could be classified as 'simple contamination with localised effects of short duration.' Further, should untreated wastewater be released into the watercourse or sea, there will be a 'limited number of people' that would be affected, and the 'community could function as normal with some inconvenience.'  It should be noted that the release of untreated wastewater to the watercourse is representative of current practice in Arklow town.  As outlined in Chapter 14, a 'locally important' aquifer is located beneath the site of the proposed development. This aquifer is classified as being of 'low vulnerability'	6



Risk ID	Potential Risk	Possible cause	Environmental effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
F	Fire/Explosion	Equipment or infrastructure failure; Electrical problems; and Employee negligence.	Illness or loss of life; Damage to, or depletion of habitats and species; and Impacts on ambient air quality.	2	The WwTP is very unlikely to give rise to fire or explosion.  As outlined in Chapter, diesel will be stored on-site to supply the emergency generator. However, is not considered to be a significant fire risk.  In accordance with Chapter 19 of the Safety, Health and Welfare at Work Act 2005 (the 2005 Act), the development shall be subject to a fire safety risk assessment which would assist in the identification of any major risks of fire on site, and mitigation of the same during operation.	3	Should a fire/explosion occur at the WwTP site, a serious impact would occur in that a significant number of people in the affected area could be impacted with multiple fatalities (<5). Further, 'external resources would be required for personal support' and 'there would be simple contamination with widespread effects for an extended duration.'  The 'generic command, control & co-ordination systems' as well as the 'common elements of response' detailed in the Wicklow County Council Major Emergency Plan will work to reduce the consequence of potential fire/explosions at the site.	6
G	Collapse/ damage to structures	Earthquakes; and Vehicular collisions.	Injury or loss of life.	1	According to the Irish National Seismic Network (INSN), earthquakes measuring ~2 on the Richter Scale are "normal" in terms of seismicity in Ireland. These are known as microearthquakes; they are not commonly felt by people and are generally recorded only on local seismographs. As such, buildings in Ireland are extremely unlikely to be damaged or collapse due to seismic activity.	3	In the event of a building collapse, a serious impact would occur in that 'a significant number of people in affected area would be impacted with multiple fatalities (<5), multiple serious or extensive injuries (20), significant hospitalisation.'	3

Risk ID	Potential Risk	Possible cause	Environmental effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
					Having regard to on-site speed restrictions and vehicular movements, it is not predicted that any collision of vehicles and the WWTP buildings/infrastructure would result in significant damage/collapse.			
H	Vehicle collisions on site	Employee negligence; and Failure of vehicular operations.	Injury or loss of life.	3	A limited number of vehicles will be permitted on the site of the WWTP to facilitate servicing/maintenance of equipment /infrastructure, the removal of de-watered sludge, and staff/visitor parking.  As such, it can be determined that there is some 'opportunity, reason or means' for a vehicle collision to occur on site, 'at some time.' An unlikely risk is therefore predicted.	1	A minor consequence is predicted. Having regard to on-site speed limits and vehicular movements, a 'small number of people would be affected' should a vehicular collision occur, with 'no fatalities and small number of minor injuries with first aid treatment.'	3

The risk assessment in Table 19.7 categorises each of the potential risks by their ‘risk score.’ A corresponding risk matrix is provided in Table 19.8, which is colour coded in order to provide an indication of the critical nature of each risk. As outlined in **Section 19.2.4.2**, the red zone represents ‘high risk’ scenarios’, the amber zone represents ‘medium risk scenarios’ and the green zone represents ‘low risk scenarios.’

Table 19.7: Risk scores

Risk ID	Potential Risks	Likelihood Rating	Consequence Rating	Risk Score
E	Discharge, spillage or longer-term seepage of untreated wastewater, fuel, chemicals solvents etc. into watercourse or groundwater table	3	2	6
F	Fire/Explosion	2	3	6
C	Flooding of WwTP resulting in uncontrolled releases of untreated wastewater into the watercourse	2	2	4
D	Incident at nearby SEVESO site resulting in cumulative environmental impact	1	4	4
A	Flooding of WwTP site during the construction of the replacement revetment	2	2	4
H	Vehicle collisions on site	3	1	3
G	Collapse/ damage to structures	1	3	3
B	Bridge collapse	1	2	2

Table 19.8: Risk Matrix

<b>Likelihood Rating</b>	<b>Very likely</b>	<b>5</b>					
	<b>Likely</b>	<b>4</b>					
	<b>Unlikely</b>	<b>3</b>		E			
	<b>Very unlikely</b>	<b>2</b>		A, C	F		
	<b>Extremely Unlikely</b>	<b>1</b>	H	B	G	D	
			<b>Minor</b>	<b>Limited</b>	<b>Serious</b>	<b>Very Serious</b>	<b>Catastrophic</b>
			<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
			<b>Consequence Rating</b>				

As outlined in Table 19.8, the potential risks identified during the construction and operation of the proposed development can all be classified as ‘low risk scenarios.’

The scenario with the highest risk score in terms of a major accident and/or natural disaster during the construction phase of the proposed development was identified as being ‘flooding of WwTP site during the construction of the replacement revetment.’

The scenarios with the highest risk score in terms of a major accident and/or natural disaster during the operational phase of the proposed development were identified as being ‘discharge, spillage or longer-term seepage of untreated wastewater, fuel, chemicals solvents etc. into watercourse or groundwater table’, and ‘fire/explosion.’

#### **19.4.4 Flooding of WwTP Site during the Construction of the Replacement Revetment**

There is a potential risk of the WwTP site flooding during the construction of the replacement revetment. However, as outlined in **Chapter 5**, the removal of the existing rock revetment and construction of the replacement revetment will be carried out in a staged process along the revetment in sections of approximately 15 to 25m. By using this method, the section under construction can be quickly protected during storm events and thus flood risk for the WwTP site will be minimised during the construction of the revetment.

As such, the risk of flooding to the WwTP site during the construction of the revetment was given a risk score of 4. This indicates a scenario that is ‘very unlikely’ to occur, and will have ‘limited’ consequences should it do so, representing a ‘low risk scenario’.

#### **19.4.5 Discharge, Spillage or longer-term Seepage of untreated Wastewater, Fuel, Chemicals Solvents etc. into Watercourse or Groundwater Table**

There is a potential risk of untreated wastewater being released into the watercourse from a WwTP facility, following the occurrence of an incident or malfunction on-site.

However, as outlined in **Section 19.2.1**, the scope of this assessment has been based on the understanding that the proposed development will be designed, built and operated in line with best international current practice. As such, the risk of discharge, spillage or longer-term seepage of untreated wastewater, fuel, chemicals solvents etc. into the watercourse or groundwater table, resulting in a major accident and/or disaster, was given a risk score of 6. This indicates a scenario that is ‘unlikely’ to occur, and will have ‘limited’ consequences should it do so, representing a ‘low risk scenario.’

## 19.4.6 Fire/Explosion

As with any industrial development or place of work, there is a potential risk of fire/explosion at the proposed WwTP facility.

However, as outlined in **Section 19.2.1**, the scope of this assessment has been based on the understanding that the proposed development will be designed, built and operated in line with best international current practice. Further, in accordance with Chapter 19 of the Safety, Health and Welfare at Work Acts 2005 to 2014, the proposed development shall be subject to a fire safety risk assessment which will assist in the identification of any major risks of fire on site, and mitigation of the same during operation.

As such, the risk of fire/explosion occurring at the proposed development resulting in a major accident and/or disaster was given a risk score of 6. This indicates a scenario that is ‘very unlikely’ to occur, but will have ‘serious’ consequences should it do so, representing a ‘low risk scenario.’

## 19.5 Mitigation Measures and Monitoring

### 19.5.1 Mitigation

#### 19.5.1.1 Mitigation During Construction

As outlined in **Section 19.4**, the scenario with the highest risk score in terms of the occurrence of major accident and/or disaster during construction was identified as ‘flooding of WwTP site during the construction of the replacement revetment.’

The construction methodology employed by the contractor, that will involve replacement of the revetment in sections, will work to mitigate the risk of flooding in that it will enable the section under construction to be quickly protected during storm events.

Further, and as outlined in **Section 5.9** and **Appendix 5.1**, a detailed CEMP will be prepared prior to the commencement of any works and implemented during the works. The CEMP will be a live document maintained by the contractor that will work to ensure that potential risks of major accident and/or disaster are identified, avoided and mitigated, as necessary. Refer to **Appendix 5.1** for an outline CEMP that sets out the minimum standards to be employed by the contractor.

#### 19.5.1.2 Mitigation During Operation

As outlined in **Section 19.2.1**, the proposed development will be designed and built in line with best international current practice and, as such, mitigation against the risk of major accidents and/or disasters will be embedded through the design.

In accordance with the provision of the European Commission Guidance<sup>2</sup> a Risk Management Plan will be prepared and implemented on site to ensure an effective response to disasters or the risk of accidents. The plan should include sufficient preparedness and emergency planning measures.

Further, a maintenance programme will be implemented at the site, in compliance with the conditions of the Waste Water Discharge Authorisation required under the Waste Water Discharge (Authorisation) Regulations 2007 - 2016. The purpose of the maintenance programme is to ensure that all critical equipment at the WwTP and elsewhere throughout the proposed development is operating correctly, therefore reducing the risk of major accidents and/or disasters on site.

As outlined in **Section 19.4**, the scenarios with the highest risk score in terms of a major accident and/or disaster during operation were identified as ‘discharge, spillage or longer-term seepage of untreated wastewater, fuel, chemicals solvents etc. into the watercourse or groundwater table,’ and ‘fire/explosion.’

The storage of diesel in a contained and bunded area on-site will mitigate ‘*by prevention*’ the risk of surface and/or ground pollution, as well as the risk of fire/explosion resulting from the potential spillage of fuel.

As a further means of mitigation ‘*by remedy*,’ fire extinguishers will be provided in the Administration building, and an industrial purpose fire hose reel will be installed to service both the Inlet Works Building and the Process Building, in accordance with the relevant NSAI Standards<sup>11</sup>.

The proposed development will also be subject to a fire safety risk assessment in accordance with Chapter 19 of the Safety, Health and Welfare at Work Acts 2005 to 2014, which will assist in the identification of any major risks of fire on site, and mitigation of the same during operation.

## 19.5.2 Monitoring

### 19.5.2.1 Monitoring During Construction

As outlined in **Section 5.9** and **Appendix 5.1**, a detailed CEMP will be prepared prior to the commencement of any works and implemented and monitored during the works. The CEMP will be a live document maintained by the Contractor, and will work to ensure that potential risks of major accident and/or disaster are monitored, as necessary.

Refer to **Appendix 5.1** for an outline CEMP that sets out the minimum standards to be employed by the contractor.

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<sup>11</sup> NSAI (2015) *IS291:2015 Selection, commissioning, installation, inspection and maintenance of portable fire extinguishers*. NSAI (2012) *IS EN 671-1:2012: Fixed firefighting systems. Hose systems. Hose reels with semi-rigid hose*.

### 19.5.2.2 Monitoring During Operation

Irish Water and the operator of the proposed development will continue to assess the risk of major accidents and/or disasters on site on an on-going basis during operation.

The maintenance programme, record of reported incidents, as well as general site activities will be monitored on an on-going basis to ensure risk of major accidents does not increase over time.

## 19.6 Residual Effects

### 19.6.1 Residual Effects during Construction

The risk of a major accident and/or disaster during the construction of the proposed development is considered 'low' in accordance with the risk evaluation methodology<sup>7</sup>. It is considered that there will not be significant residual effect(s) during the construction of the proposed development.

### 19.6.2 Residual Effects during Operation

The risk of a major accident and/or disaster during the operation of the proposed development is considered 'low' with regards the risk evaluation methodology<sup>7</sup>. It is therefore considered that there will not be significant residual effect(s) during the operation of the proposed development.

## 19.7 References

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).

Department of Defence. (2017). *A National Risk Assessment for Ireland 2017*

Department of Environment, Heritage and Local Government. (2010) *A Guide to Risk Assessment in Major Emergency Management*

Directive 2012/18/EU of the European Parliament and the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC (OJ L 197, 24.7.2012, p. 1).

Environmental Protection Agency. (2017). *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*

Environmental Protection Agency. (2014). *Guidance on Assessing and Costing Environmental Liabilities*

European Commission (2017) *Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report*

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Wicklow County Council. (2015). *Major Emergency Plan*