14. MAJOR ACCIDENTS AND NATURAL DISASTERS

14.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) describes the likely significant adverse effects on the environment arising from the vulnerability of the Proposed Development as detailed in Chapter 4 to risks of major accidents and/or natural disasters, as well as the potential of the Proposed Development itself to cause potential major accidents and/or natural disasters. It has been completed in accordance with the guidance set out by the Environmental Protection Agency (EPA) in '*Guidelines on Information to be contained in Environmental Impact Statements'* (EPA, 2022) and the European Commission in relation to Environmental Impact Assessment of Projects (Directive 2011/92/EU, as amended by 2014/52/EU), namely '*Guidance on the preparation of the Environmental Impact Assessment Report'.*

The assessment of the vulnerability of the Proposed Development to major accidents and natural disasters, as well as the risk of the Proposed Development itself causing accidents or disasters is carried out in compliance with the EIA Directive (2014/52/EU) 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 objective of this assessment is to ensure that appropriate precautionary actions are taken for those projects.

> *"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 or could cause;
- 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.

14.1.1 Statement of Authority

This section of the EIAR has been prepared by Tom Madden and reviewed by Owen Cahill and Michael Watson, all of MKO. Tom is an Environmental Scientist and has over three years working in various Environmental Consultancies throughout Ireland. He holds a BSc (Hons) in Environmental Science from the University of Limerick. Owen has over thirteen years' experience in the environmental sector and had worked as an Environmental Officer with Kepak and prior to which he held a post with Pentland Macdonald Contaminated Land & Water Specialists in Northern Ireland. Owen has project managed the Environmental Impact Assessment of a range of development projects across the Ireland and holds Full Membership with the Institute of Environmental Management & Assessment and is a Chartered Environmentalist. Michael has over nineteen years' experience in the environmental sector and had worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael

completed an MA in Environmental Management at NUI, Maynooth in 1999. Michael is a professional geologist (PGeo) and full member of IEMA (MIEMA) as well as a Chartered Environmentalist (CEnv).

14.2 Assessment Methodology

14.2.1 General

Major accidents or natural disasters are hazards which have the potential to affect the Proposed Development and lead to environmental effects directly and indirectly. 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 is considered in relation to the information required to be provided in the EIAR, i.e. population and human health, biodiversity, land, soil, water, air and climate and material assets, cultural heritage and the landscape.

14.2.2 Legislative Context

14.2.2.1 Legislation

An assessment of the following key elements was undertaken in accordance with the EIA Directive (2014/52/EU):

- The vulnerability of the proposed Scheme to potential accidents and disasters
- The proposed Scheme's potential to cause major accidents or disasters which pose a risk to human health, cultural heritage and/ or the environment.

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".*

14.2.2.2 Guidance Documents

The following guidance documents have been consulted in the preparation of this section:

- European Commission. (2017). Environmental Impact Assessment of Projects – Guidance on the preparation of Environmental Impact Assessment Reports
- Environmental Protection Agency (2022), Guidelines on the Information to be Contained in Environmental Impact Assessment Reports
- Department of Environment, Heritage and Local Government (2010) *A Guide to Risk Assessment in Major Emergency Management*
- Environmental Protect Agency (2014) Guidance on Assessing and Costing Environmental Liabilities
- Department of Defence (2020) A National Risk Assessment for Ireland
- Galway County Council (2021) – Major Emergency Plan

14.2.3 Categorisation of the Baseline Environment

A desk-study has been completed to establish the baseline environment for which the proposed risk assessment is being carried out. This will influence both the likelihood and the impact of a major accident or natural disaster. Local and regional context has been established prior to undertaking the risk assessment to develop an understanding of the vulnerability and resilience of the area to emergency situations.

Further detail on the baseline environment is provided in Section 14.3

14.2.4 Impact Assessment Methodology

14.2.4.1 Introduction

A modern sand quarry development is not a recognised source of pollution. It is not subject to Industrial Emissions Directive regulation or any other Environmental Protection Agency environmental regulatory consent. Should a major accident or natural disaster occur the potential sources of pollution onsite during the operational phase are limited and of low environmental risk. Sources of pollution with the potential to cause significant environmental pollution and associated negative effects such as bulk storage of hydrocarbons or chemicals, storage of wastes, management of flammable materials etc. are limited and so there is an inherent low level of environmental risk associated with major accident or natural disaster impacting the Proposed Development and causing environmental damage.

There is low potential for significant natural disasters to occur at the proposed development site. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited to issues such as flooding and are described in the Sections below.

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. The proposed site is not regulated or connected to or close to any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e. SEVESO sites and so there are no potential effects from this source. The closest SEVESO site is located approximately 22.8km to the north at Ballyhaunis, Co. Mayo.

The Proposed Development has low potential to cause natural disasters or major accidents. The site is relatively flat and is not a peatland site and so there is no potential for peatslides or landslides. Any risks associated with flooding, impacts on infrastructure, accidents etc are addressed in the Sections below.

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 5 to 13 for further detail).

14.2.4.2 Site-Specific Risk Assessment Methodology

A site-specific risk assessment identifies and quantifies risks focusing on unplanned, but possible and plausible events occurring during the operational phase 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 on Assessing and Costing Environmental Liabilities'* document[1]. The following steps were taken as part of the site-specific risk assessment:

[1] *EPA (2014) Guidance on assessing and costing environmental liabilities. Available at https://www.epa.ie/publications/compliance--enforcement/licensees/reporting/financial-provisions/EPA_OEE-Guidance-and-Assessing-WEB.pdf*

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

14.2.4.2.1 Risk Identification

Risks have been reviewed through the identification of reasonably foreseeable risks in consultation with relevant contributors to this EIAR. 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 EIAR Guidance, risks are identified in respect of the projects:

1. *Potential to cause accidents and/or disasters,*
2. *Vulnerability to potential disaster/accident*

14.2.4.2.2 Risk Classification

Classification of Likelihood

After identifying 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 14-1 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.

Table 14-1 Classification of Likelihood (Source: DoEHLG, 2010)

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. Furthermore, the Galway County Council Major Emergency Plan, will 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 14-2.

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 14-2 Classification of Impact (Source: DoEHLG, 2010)

Ranking	Likelihood	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.

Ranking	Likelihood	Impact	Description
			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 *Guide to Risk Assessment in Major Emergency Management* and as outlined in Table 14-3) 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 14-3 Classification of Impact (Source: DoEHLG, 2010)

	Consequence Rating				
	1.Minor	2.Limited	3. Serious	4.Very Serious	5.Catastrophic

14.3 Baseline Conditions

The Major Emergency Plan prepared by Galway County Council (2021) outlines the following potential major emergency scenarios in County Galway:

1. Hazardous Sites Emergencies:

- The European Communities Control of Major Accident Hazards Involving Dangerous Substance Regulations, 2000, applies to sites where certain quantities of specified dangerous substances are present. These sites (SEVESO Sites) are classified as upper tier and lower tier.
- There are **two** SEVESO III / COMAH sites in Galway County Council's functional area (one site is upper tier and one site is lower tier). There is also **one** SEVESO III / COMAH upper tier site in Galway City Council's functional area located in the Galway Harbour Enterprise Park, Galway Docks. These are listed in the table below:

Table 14-4 SEVESO/COMAH Sites in County Galway

Name	Address	Classification	Activity
Colas Bitumen Emulsion (West)	Oranmore, Co. Galway	Upper Tier	Chemical Plant
Circle K	Galway Harbour	Upper Tier	Fuel Terminal
Tynagh Energy	Tynagh, Co. Galway	Lower Tier	Power Station

As stated above, the closest SEVESO site to the proposed development is the Flogas Ireland Ltd facility which is located approximately 22.8km to the north at Ballyhaunis. This facility is a Lower Tier Establishment and is located in the functional area of Mayo County Council.

2. Transport Emergencies:

- M6, M17 and M18 Motorways,
- National Primary Routes N6, N17 & N18,
- Iarnród Éireann: Galway – Athlone, Galway – Ennis Rail Lines,
- Airports, including Island Airports,
- Galway Harbour,
- Rossaveel Harbour

- Offshore Inhabited Islands and Ferries

3. Natural Emergencies:
    - Flooding,
    - Severe Weather,
    - Landslides,
    - Tsunami.
4. Technological Emergencies
    - COMAH Sites,
    - Large Fires/Leaks,
    - Hazardous Materials Incidents,
    - Environmental Pollution.
5. Civil Emergencies
    - Terrorism,
    - Large Crowd Events,
    - Loss of Critical Infrastructure,
    - Pollution of Water Supplies,
    - Communicable Diseases/Public Health Emergencies
6. Utility company emergencies:
    - Bord Gáis,
    - ESB,

The risks from which are most relevant to this assessment are described below:

Critical Infrastructure Emergencies

It is anticipated that the Proposed Development will make use of the M6 and M17 Motorways for delivery of infrastructure to the site for the installation of the processing plant and associated components and during the operational phase where sand is being distributed nationwide. Potential impacts that may occur on these motorways could be caused by an accident during the transport of materials or damage to infrastructure caused by severe weather, natural disaster, etc.

Severe Weather

The Proposed Development is located approximately 36.5km from the Atlantic Ocean and therefore is likely to be impacted by low pressure systems or extreme wind speeds. Potential severe weather effects are assessed below. As is standard practice, works will be paused in the event of a Status Red weather warning issued by Met Eireann. This mitigates significantly the potential for effects associated with severe weather events during these phases.

Flooding

As detailed in Chapter 8, no recurring flood incidents within the Proposed Development site were identified from OPW's Past Flood Event Mapping (Refer to Figure 8-3 in Chapter 8 of the EIAR).

The closest mapped recurring flood event is at the location of Gortagarraun Turlough, 1.3km to the northeast of the Proposed Development site where "*low lying land floods after heavy rain every year*". The flooding is caused by rising groundwater levels over the winter period.

The National Indicative Fluvial Mapping (NIFM) for the Present-Day Scenario was consulted which has estimated the 100-year and 1000-year fluvial flood zones for the Levally Stream. As seen in Figure 8-4 in Chapter 8, the Proposed Development site is outside the 100-year (medium probability) and 1,000-year (low probability) fluvial flood zones. The nearest flood zones mapped 0.7km to the east of the Proposed Development site along the Levally Stream. The Proposed Development site is therefore located in Flood Zone C (Low Risk).

The site is not susceptible to pluvial flooding (surface water ponding) due to the permeable nature of the soils and subsoils and no such pluvial flood zones are mapped within the Proposed Development site or in the surrounding lands.

Tidal flooding is not relevant as the subject site is approximately 36.5km from the coast and more than 82m above sea level The closest recorded tidal flood event occurred approximately 40km to the south-west at Salthill.

According to EPA Website Watercourse Data, there are no watercourses within the proposed site boundary or in close proximity to the site. The nearest surface water feature to the site is the Dunblaney Stream (EPA Code: 30D34 – Order 1) which is at its closest to the site approximately 605 metres to the east. Levalley Lough is located approximately 2.7km to the south. The location and extents of these watercourses correlate with the fluvial flood risk represented in the PFRA Maps.

Utility company emergencies

The Proposed Development will be constructed on a site that is comprised of grassland and hedgerows. Local utilities and services are in close proximity to the site along its eastern boundary adjacent to the L2232 road. Due to the current state of the site, i.e., greenfield, it is highly unlikely that there are existing services and utilities located within the site boundary. Nonetheless, care will be taken during excavation works in the case that there are unidentified services or utilities buried within the confines of the site boundary.

14.3.2 Additional Risks

In addition, risks identified in the EIAR which are relevant to the Proposed Development are detailed below:

14.3.2.1 Traffic

The Proposed Development will utilise Route B as outlined in Section 13 of the EIAR during the works. Site traffic will originate from the transportation of materials from the site for sale and the transport of employees to, from and throughout the site. The localised traffic disruptions as a result of other proposed works such as the proposed road reprofiling will be mitigated through the use of industry standard traffic management measures. These traffic management measures will be designed in accordance with the Department of Transport's '*Guidance for the Control and Management of Traffic at Roadworks – Second Edition (2010)*'.

14.3.2.2 Contamination

The Proposed Development has the potential to cause contamination and pollution of groundwater and surface water from potential release of hydrocarbons, earthworks and excavations on site. These impacts are addressed in detail in the Hydrology chapter as they are not related to either the vulnerability of the project to natural disasters or major accidents nor the potential for the project to cause natural disasters or accidents. Indirect impacts associated with major accidents and / or natural disasters on contamination are considered in this chapter.

14.4 Risk Assessment

This section outlines the possible risks associated with the Proposed Development for the consturction and operational phases.

These risks have been assessed in accordance with the relevant classification as outlined in Table 14-1 and 14-2.

As outlined in Section 14.4.1.1.4, 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 i.e. pre-mitigation.

14.4.1.1 Likely Significant Effects

14.4.1.1.1 *Do-Nothing Scenario*

If the Proposed Development were not to proceed, the existing condition of the site would not change.

If the Proposed Development were not to proceed, the opportunity to provide a high-quality construction material (sand) to the construction industry at a time when demand for such materials is high would be lost.

The opportunity to generate local employment and investment would also be lost as would the opportunity to expand and diversify the local economy.

14.4.1.1.2 *Identification of Effects During Construction*

A risk register has been developed which contains all potentially relevant risks identified during the site enabling works of the Proposed Development. Seven risks specific to the site enabling works of the Proposed Development have been identified and are presented in Table 14-5.

Table 14-5 Risk Register - Construction Phase

Risk ID	Potential Risk	Possible Cause
Potential vulnerability to disaster risks		
A	**Critical Infrastructure Emergencies** Risk of delivery of materials and equipment to site.	Traffic accident during site enabling works or equipment delivery or when materials are being transported from the site, extreme weather periods of heavy rainfall, taking into account climate change and strong winds
B	**Severe Weather** Risk to activity on site	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds
C	**Flooding** Risk of fluvial flooding in areas surrounding the site impacting the site enabling works and leading to environmental emissions	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds

Potential to cause accidents and / or disasters.		
D	**Utility emergencies** Risk of activity at the proposed development site	Activity at the proposed development site impacting on local services and utilities
E	**Traffic Incident** Collisions onsite and offsite with vehicles involved in construction of the Proposed Development	Driver negligence or failure of vehicular operations on site roads. Traffic Management not implemented
F	**Contamination** Discharge or leakage of of fuel, chemical solvents, untreated water into watercourse or percolated to groundwater.	Accidental fuel spillage during delivery to site. Failure of fuel storage tank or tanks in plant and machinery and vehicles leading to uncontrolled emissions. Drainage and seepage water resulting from accident associated with water storage or treatment. Stockpiled excavated material becoming unstable and providing a point source of exposed sediment. Excavation works during the operational phase of the Proposed Development which may result in entrainment of sediment from the excavations.
G	**Fire / Gas Explosion**	Equipment or infrastructure failure; Electrical problems; and Employee negligence.

14.4.1.1.3 *Identification of Effect During Operation*

Five risks specific to the operation of the Proposed Development have been identified and are presented in Table 14-6.

Table 14-6 Risk Register – Operational Phase

Risk ID	Potential Risk	Possible Cause
Potential vulnerability to disaster risks		

H	**Severe Weather** Risk to operational activity on site, damage to processing plant, machinery and other infrastructure	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds.
I	**Contamination** Discharge or spillage of fuel, chemical solvents, sewage or wastewater into watercourse or percolated to groundwater	A vehicular incident on the public road involving fuel, wastewater or sewage transportation in the operational phase. Spill or leak of oil during operational phase.
Potential to cause accidents and / or disasters.		
J	**Fire / Gas Explosion**	Equipment or infrastructure failure; Electrical problems; and Employee/resident negligence.
K	**Collapse / damage to structures**	Earthquake, extreme weather events; and Vehicular collisions due to driver negligence on public roads.
L	**Traffic Incident** Collisions onsite and offsite with vehicles involved in operation of Proposed Development	Driver negligence or failure of vehicular operations on site roads. Traffic Management not implemented

The risk register is based upon possible risks associated the Proposed Development. As outlined in Section 14.4.1.1.4, 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.

14.4.1.1.4 Assessment of Effect – Summary

Table 14-7 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)
Site Enabling Works								
A	**Critical Infrastructure Emergencies**	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds	Illness or loss of life;	1	The risk of traffic accident during equipment delivery severe weather conditions impacting the M6 and M17 is unlikely when considering the assessment in Chapter 9 (weather conditions recorded over the last 30 years within the area) and Chapter 13 – Traffic Assessment	1	The risk of a traffic accident due to severe weather conditions during the site enabling works phase will result in a minor consequence in that 'small number of people would be affected' should a severe weather occur, with 'no fatalities and a small number of minor injuries with first aid treatment'.	1
B	**Severe Weather**	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds	Illness or loss of life;	2	The risk of severe weather is unlikely when considering the weather conditions recorded over the last 30 years within the area. Excavation works will take account of weather forecasts and predicted	1	The risk of severe weather conditions during the site enabling works will result in a minor consequence in that 'small number of people would be affected' should a severe weather occur, with 'no fatalities and a small number of	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
					rainfall in particular and works will be paused if required.		minor injuries with first aid treatment'. Severe weather may cause increased mobilisation of sediment which will be controlled via the project design and mitigation measures.	
C	**Flooding**	Extreme weather-periods of heavy rainfall, taking into account climate change and strong winds	Illness or loss of life; Groundwater Flooding	2	The risk of flooding is considered very unlikely when taking into account the baseline assessment in Chapter 8 of the EIAR and due to no recurring or historic flood incidents are recorded within the proposed development site.	1	The risk of flooding during the site enabling works/operation phase will result in a minor consequence in that 'small number of people would be affected' should a severe weather occur, with 'no fatalities and a small number of minor injuries with first aid treatment' Flooding has the potential to cause increased sediment mobilisation however flooding is not anticipated and should any flooding occur it would be localised.	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
D	**Utility emergencies**	Excavation activity along road network during works impacting on local services and utilities	Illness or loss of life; Disruption to services	2	The proposed excavations will take into consideration any services and utilities within the site and the adjacent road network.	1	The risk of impact on utilities and services during the site enabling works or operational phase will result in a minor consequence in that 'small number of people would be affected, with 'no fatalities and a small number of minor injuries with first aid treatment'	2
E	**Traffic Incident**	Driver negligence or failure of vehicular operations within the site. Traffic Management not implemented	Injury or loss of life.	3	A limited number of vehicles will be permitted on the site during both the construction and operational phase. 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

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
F	**Contamination – Fuel storage and handling** **-General Construction**	An accident causing failure of fuel storage tank or tanks in plant and machinery and vehicles.	Contamination of local drinking water supplies, surface waters and groundwater aquifers.	2	As outlined in Chapter 4, refuelling will be carried out in a dedicated refuelling area within the site. A small quantity of oils and hydraulic fluids may be stored on site. These will be stored in a bunded area to ensure containment and prevent spillages of fuel. Standard and specific mitigation to prevent accidents and indirect effects of accidents are included in the project design and will be implemented.	2	The risk of a fuel spillage or impact on surrounding drainage as a result of an accident during the site enabling works/operational phase will result in a limited consequence in that there would be 'a limited number of people affected' with 'localised effects of short duration' on environmental receptors through the use of bunded containment areas. The potential residual environmental effects are described in detail in Chapter 7 and Chapter 8 which concludes that there will be no significant environmental effects.	4
G	**Fire / Gas Explosion**	Equipment or infrastructure failure;	Illness or loss of life; Damage to, or depletion of	2	As outlined in Chapter 4, fuels or oils will be stored at the designated refuelling area, therefore fuel is not	2	Should a fire/explosion occur at the site, a limited consequence in that there would be 'a limited number of people affected' with	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		Fuel spillage/storage Electrical problems; and Employee negligence causing an accident	habitats and species; and Impacts on ambient air quality.		considered to be a significant fire risk.		'localised effects of short duration' on people and environmental receptors due to the nature of the project and the lack of infrastructure or fuel storage during operation that would result in any such incident. There will be 'normal community functioning' in the area with 'some inconvenience' The 'generic command, control & co-ordination systems' as well as the 'common elements of response' detailed in the Galway County Council Major Emergency Plan will work to reduce the consequence (both on people and the environment) of potential fire/explosions at the site.	
Operational Phase								

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
H	**Severe Weather**	Extreme weather-periods of heavy rainfall, taking into account climate change and strong winds	Illness or loss of life;	2	The risk of severe weather is unlikely when considering weather conditions recorded over the last 30 years within the area.	1	The risk of severe weather conditions during the Operational phase will result in a minor consequence in that 'small number of people would be affected' should a severe weather occur, with 'no fatalities and a small number of minor injuries with first aid treatment'.	2
I	**Contamination**	A vehicular incident on the public road or within the site involving fuel, chemicals or untreated water, in the operational phase	Damage to, or depletion of aquatic habitats and species Contamination of local drinking water supplies and groundwater aquifers.	2	As outlined in Chapter 4, fuel will not be stored on-site, therefore fuel is not considered to be a contamination risk in the operational phase.	1	The risk of a fuel spillage or impact on surround drainage during the operational stage will result in a limited consequence in that there would be 'a limited number of people affected' with 'localised effects of short duration' through the use of bunded containment areas during operation. The potential residual environmental effects are described in detail in Chapter 7 which concludes that there will be	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
							no significant environmental effects.	
J	**Fire / Gas Explosion**	Equipment or infrastructure failure; Fuel spillage/storage 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	As outlined in Chapter 4, fuel will not be stored on-site, therefore fuel is not considered to be a significant fire risk.	2	Should a fire/explosion occur at the site, a limited consequence in that there would be 'a limited number of people affected' with 'localised effects of short duration' on people and environmental receptors due to the nature of the project and the lack of infrastructure or fuel storage during operation that would result in any such incident. There will be 'normal community functioning' in the area with 'some inconvenience' The 'generic command, control & co-ordination systems' as well as the 'common elements of response' detailed in the Galway County Council Major Emergency Plan will work	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
							to reduce the consequence (both on people and the environment) of potential fire/explosions at the site.	
K	**Collapse/ damage to structures**	Earthquakes, extreme weather events; and Vehicular collisions due to driver negligence on public roads.	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. Having regard to public speed limits within the site, it is not predicted that any collision of vehicles and any infrastructure would result in significant damage/collapse.	1	The risk of infrastructure collapse during the operational phase will result in a minor consequence in that 'small number of people would be affected' and no real likelihood of any impact on any environmental receptors.	1

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
L	**Traffic Incident**	Driver negligence or failure of vehicular operations on site roads. Traffic Management not implemented	Injury or loss of life.	3	A limited number of vehicles will be permitted on the site as part of the operation phase. 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 for each of the potential risks identified are consolidated in Table 14-8 which provides their 'risk score.' A corresponding risk matrix is provided in Table 14-9, which is colour coded in order to provide an indication of the critical nature of each risk. As outlined in Section 14.4.1.1.2, the red zone represents 'high risk' scenarios', the amber zone represents 'medium risk scenarios' and the green zone represents 'low risk scenarios.

Table 14-8 Risk Scores

Risk ID	Potential Risk	Likelihood Rating	Consequence Rating	Risk Score
Site Enabling Works				
A	Critical Infrastructure Emergencies	1	1	1
B	Severe Weather	2	1	2
C	Flooding	2	1	2
D	Utility company emergencies	2	1	2
E	Traffic Incident	3	1	3
F	Contamination	2	2	4
G	Fire / Gas Explosion	2	2	4
Operational Phase				
H	Severe Weather	2	1	2
I	Contamination	2	1	2
J	Fire / Gas Explosion	2	2	4
K	Collapse/ damage to structures	1	1	1
L	Traffic Incident	3	1	3

Table 14-9 Risk Matrix

		Consequence Rating				
		1.Minor	2.Limited	3. Serious	4.Very Serious	5.Catastrophic
Likelihood Rating	5.Very Likely					
	4. Likely					
	3. Unlikely	E,L				
	2. Very Unlikely	B,C,D,H,I,	F,G,J			
	1. Extremely Unlikely	A,K				

Table 14-9 presents the potential risks identified during the site enabling works and operational phases of the Proposed Development all of which can 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 site enabling works for the Proposed Development is identified below.

14.4.1.2 Contamination During Construction

There is a potential risk of contamination from site activities during the site enabling works as a result of potential release of hydrocarbons. The risk of contamination was given a risk score of 4 on a very precautionary basis. However, as outlined in Chapter 4 Section 4.5, Chapter 7 and Chapter 8, measures will be put in place to reduce the risk of accidental spillage and contamination of pollution risk to groundwater, surface water and associated ecosystems, and to terrestrial ecology.

The risk of contamination is 'very unlikely' to occur and will have 'limited' consequences should it do so, representing a **'low-risk scenario'** during the site enabling works and operational phases.

The conclusions in the relevant chapters of the EIAR conclude that there will be no significant residual effects associated with this potential impact.

14.4.1.3 Fire/Explosion During Site Enabling Works and Operation Phase

There is a potential risk of fire/explosion at the Proposed Development site. However, as outlined in Section 14.2, the scope of this assessment has been based on the understanding that the Proposed Development will be designed, built and operated in line with current best practice. Furthermore, 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 the operational phase.

Therefore, the risk of fire/explosion occurring at the Proposed Development resulting in a major accident and/or disaster was given a risk score of 4 on a very precautionary basis. This indicates a scenario that is 'very unlikely' to occur and having 'limited' consequences should it do so, representing a '**low-risk scenario**' during the construction and operational phase.

14.4.2 Mitigation Measures

As outlined in Section 14.4, the scenario with the highest risk score in terms of the occurrence of major accident and/or disaster during construction was identified as 'Contamination' of the Proposed Development site and risk of 'Fire/Explosion' during operation.

The Proposed Development will be designed and built in line with current best 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 on the preparation of Environmental Impact Assessment Reports'*, 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 will include sufficient preparedness and emergency planning measures.

An Environmental Management Plan (EMP) has been prepared for the Proposed Development and is included in Appendix 4-2 of this EIAR. The EMP 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.

14.4.3 Residual Effects

The risk of a major accident and/or disaster during the construction of the Proposed Development is considered 'low' in accordance with the '*Guide to Risk Assessment in Major Emergency Management'* (DoEHLG, 2010).

It is considered that when the above mitigation is implemented, and all mitigation detailed in the EIAR is implemented, there will not be significant residual effect(s) associated with the site enabling works and operation phase of the Proposed Development.

14.4.4 Monitoring

14.4.4.1 Monitoring During Construction

A detailed Environmental Management Plan (EMP) will be prepared prior to the commencement of any works. The EMP 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 4-2 for an outline EMP that sets out the minimum standards to be employed by the contractor.

14.4.4.2 Monitoring During Operation

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.

14.4.5 Assessment of Cumulative and In Combination Impacts

14.4.5.1 Cumulative Impact Assessment

All elements of the Proposed Development were assessed in order to identify any cumulative effects.

A modern sand quarry development including all of its various components is not a recognised source of pollution. It is not subject to Industrial Emissions Directive regulation or any other Environmental Protection Agency environmental regulatory consent. Should a major accident or natural disaster occur, the potential sources of pollution onsite during the construction and operational phases are limited and of low environmental risk. Sources of pollution with the potential to cause significant environmental pollution and associated negative effects such as bulk storage of hydrocarbons or chemicals, storage of wastes, management of flammable materials etc. are limited and so there is an inherent low level of environmental risk associated with major accident or natural disaster impacting the Proposed Development and causing environmental damage.

There is low potential for significant natural disasters to occur at the proposed development site. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited and these have been assessed in the context of the whole project, cumulatively in this chapter and in the wider EIAR.

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. The proposed development site is not regulated or connected to or close to any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e. SEVESO sites and so there are no potential effects from this source. There is no real likelihood of significant environmental effects cumulatively associated with major accidents.

The Proposed Development has low potential to cause natural disasters or major accidents. The site is relatively flat and is not a peatland site and so there is low/no potential for peatslides or landslides. Any risks associated with flooding, impacts on infrastructure, accidents etc are addressed in the Sections above. There is no real likelihood of significant environmental effects cumulatively associated with the Proposed Developments potential to cause accidents or natural disasters.

14.4.5.2 In Combination Impact Assessment

A search in relation to projects that may have the potential to result in a cumulative impact with the project on the environment was carried out as part of the EIAR. The Proposed Development has been considered, in combination with the projects set out in Chapter 2 of the EIAR.

Following a detailed assessment of the potential for any further impact when considered in combination with any or all of the projects set out in set out in Chapter 2, the Proposed Development, with mitigation measures in place, was found to have no potential for significant in-combination or cumulative effects associated with the potential for the project to be impacted by major accidents or natural disasters or the Proposed Developments potential to cause major accidents or natural disasters. This is based on the low risk associated with the Proposed Development described in this Chapter of the EIAR and a review of the nature of the surrounding land uses and projects existing or intended in the surrounding area.