

BALLINA FLOOD RELIEF SCHEME

Chapter 21: Risks of Major Accidents or Disasters

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Chapter 21: Risks of Major Accidents and/or Disasters

Contents

Acronyms.....	iv
Glossary	iv
21 RISKS OF MAJOR ACCIDENTS OR DISASTERS	1
21.1 Introduction	1
21.2 Methodology.....	1
21.2.1 Legislation.....	1
21.2.2 Guidance.....	1
21.2.3 Zone of Influence	2
21.2.4 Environmental Sensitivities.....	2
21.2.5 Sources of Information to Inform the Assessment.....	3
21.2.6 Key Parameters for Assessment	3
21.2.7 Assessment Criteria and Significance	3
21.2.8 Consultations	6
21.3 Risk Assessment.....	6
21.3.1 Screening.....	6
21.3.2 Scoping	6
21.3.3 Stage 3 - Assessment.....	18
21.4 Assessment of Effects.....	22
21.5 Mitigation Measures	22
21.5.1 Construction Phase	22
21.5.2 Operational Phase	23
21.6 Residual Effects	23
21.6.1 Construction Phase	23
21.6.2 Operational Phase	23
21.7 Monitoring.....	23
21.7.1 Construction Phase	23
21.7.2 Operational Phase	23
21.8 Chapter References	24

Tables

Table 21-1 : Summary of Key Desktop Reports.....	3
Table 21-2: Classification of Likelihood of Occurrence	4
Table 21-3: Consequence of Impact	5
Table 21-4: Risk Matrix.....	6
Table 21-5: Summary of Key Consultation Issues Raised.....	6
Table 21-6: Stage 2 – Scoping Assessment for Major Accidents and/or Disasters: Construction Phase	8
Table 21-7: Stage 2 – Scoping Assessment for Major Accidents and/or Disasters: Operational Phase	15
Table 21-8: Stage 3 – Assessment for Major Accidents and/or Disasters	19

Chapter 21: Risks of Major Accidents or Disasters

Acronyms

Term	Meaning
CIRIA	Construction Industry Research and Information Association
CTMP	Construction Traffic Management Plan
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
FRS	Flood Relief Scheme
IEMA	Institute of Environmental Management and Assessment
NECG	National Emergency Coordination Group

Glossary

Term	Meaning
Disaster	A sudden accident or a natural catastrophe that causes great damage or loss of life.
Seveso Site	Establishments linked to activities of handling, storing, using or manufacturing dangerous substances in sufficient quantities.
Geohazards	Adverse geological condition capable of causing widespread damage or loss of property and life.

21 RISKS OF MAJOR ACCIDENTS OR DISASTERS

21.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) presents the assessment of the expected effects from risks of major accidents and/or disasters. The assessment is considered under two main scenarios:

1. The likelihood and consequence for the Proposed Scheme to cause a major accident and/or natural disaster.
2. The likelihood and consequence for the Proposed Scheme to be vulnerable to hazards resulting from a major accident and/or natural disaster.

This chapter has been informed by input from the relevant EIA specialist and their respective discipline chapters of this EIAR (**Chapters 6-19**).

21.2 Methodology

21.2.1 Legislation

Article 3 of the EIA Directive (as amended) requires the assessment of expected effects of major accidents and/or disasters within EIA. Article 3(2) of the Directive states that the:

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

Annex IV (information for the EIAR) of the 2014 EIA Directive requires:

“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.”

The 2014 EIA Directive also states:

“In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment. For such projects, it is important to consider their vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment.”

The Major Accidents (Seveso III) Directive (2012/18/EU) is an EU Directive that seeks to prevent major industrial accidents involving dangerous substances and to limit the consequences of such accidents on people and the environment. In Ireland, the Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the ‘Control of Major Accident Hazards Involving Dangerous Substances (COMAH) Regulations’), implements the Seveso III Directive. The directive addresses Seveso sites, where hazardous substances are produced, used or stored. Any Seveso sites in proximity to the Proposed Scheme are considered in **Section 21.3**.

21.2.2 Guidance

Consideration has been given to the following relevant policy documents in the preparation of this chapter:

- Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022)
- HSE Emergency Management Area 2 Crisis Management Team Major Emergency Plan 2023
- National Risk Assessment for Ireland 2023

Chapter 21: Risks of Major Accidents or Disasters

- National Risk Assessment for Ireland 2020
- Mayo County Development Plan 2022-2028
- Mayo County Council's Climate Action Strategy 2019-2024
- Mayo County Council Major Emergency Plan 2021
- A National Risk Assessment for Ireland 2020 (Department of Defence (DoD), 2021)
- Major Accidents and Disasters in EIA: A Primer (IEMA & ARUP, 2020)

There is no specific national guidance with regard to the assessment of major accidents and/or disasters for the purposes of EIA however the topic is included in the more general national EIA guidance, notably:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022) which state: *“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).”* (section 3.7.3 of EPA, 2022).
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018) which state that there are two key considerations under this requirement, namely:
 - *“The potential of the project to cause accidents and/or disasters, including implications for human health, cultural heritage, and the environment.*
 - *“The vulnerability of the project to potential disasters/accidents, including the risk to the project of both disasters (e.g. flooding) and man-made disasters (e.g. technological disasters).”*

The Guidelines also require that an EIAR include: *“... the expected effects arising from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project. Where appropriate, the description of expected significant effects should include details of the preparedness for and proposed response to such emergencies.”*

In the absence of a specific approach in national guidance, the approach used to carry out the risk assessment for this EIAR is based on that outlined in the following UK publication:

- Institute of Environmental Management and Assessment (IEMA) Major Accidents and Disasters in EIA: A Primer (IEMA 2020)
- A Framework for Major Emergency Management. Guidance Document, Department of Housing local Government and Heritage (DHLGH, 2021).

21.2.3 Zone of Influence

For the purposes of the risk assessment, the Study Area includes the extent of the Zone of Influence (Zoi) as defined in each of the specialist **Chapters 6-19** and incorporates the consultation distance of 200 m set for the European Refreshments Seveso site. Consideration has also been given to sites, i.e., Seveso sites, also known as COMAH establishments, which have potential for major accident hazard under the COMAH Regulations 2015 (S.I. No. 209 of 2015). According to EIA Directive 2014/52/EU, the Proposed Scheme's potential to cause accidents and/or natural disasters focuses on the effect to human health, cultural heritage and the environment. Environmental receptors are identified as those listed within Article 3 of the EIA Directive, namely population and human health, biodiversity (particularly species and habitats protected under the Habitats Directive (92/43/EEC) and Birds Directive (2009/147/EC), land, soil, water, air, climate, material assets, cultural heritage and the landscape.

21.2.4 Environmental Sensitivities

The Proposed Scheme is centred on Ballina Town and is located within approximately 600 m from the River Moy which is designated as a Special Area of Conservation (SAC) (Killala Bay / Moy Estuary SAC) and downstream of the Killala Bay/Moy Estuary SPA. The River Moy, renowned for recreational fishing, is an

Chapter 21: Risks of Major Accidents or Disasters

important contributor to the town’s tourism and recreational amenity value. It also contains a diverse range of aquatic species and habitats.

Ballina Town has a long history of flooding from the River Moy. The scheme area is subject to fluvial and tidal flooding within the ZoI. The predicted flooding within the ZoI affects both residential and commercial properties (See **Chapter 5: Project Description**), and there are extensive records of historic flooding.

21.2.5 Sources of Information to Inform the Assessment

In addition to review of the chapters and assessments, information was also derived from a desktop review of existing studies and datasets as summarised in **Table 21-1** .

Table 21-1 : Summary of Key Desktop Reports

Title	Source	Year
HSE Emergency Management Area 2 Crisis Management Team Major Emergency Plan	Health Service Executive	2023
National Risk Assessment for Ireland 2023	Irish Government	2023
National Risk Assessment for Ireland 2020	Irish Government	2020
Mayo County Development Plan 2022-2028	Mayo County Council	2022
Mayo County Council’s Climate Action Strategy 2019-2024	Mayo County Council	2019
Mayo County Council Major Emergency Plan 2021	Mayo County Council	2021
GSI Spatial Resources Database	Geological Survey Ireland	2023

21.2.6 Key Parameters for Assessment

The assessment of potential for risk of major accident and/or natural disaster has been based on the design and activities associated with the construction and operational phases of the Proposed Scheme as described in detail in **Chapter 5: Project Description**.

As noted in **Section 21.2**, the assessment considers the potential for the Proposed Scheme to cause a major accident and/or natural disaster and the potential for the Proposed Scheme to be vulnerable to hazards resulting in a major accident and/or disaster.

21.2.7 Assessment Criteria and Significance

This assessment broadly applies the approach set out in Major Accidents and Disasters in EIA: A Primer (IEMA, 2020). Unlike most assessments within the EIAR, the assessment does not deal with likely effects. The scope of this assessment focuses on potential sudden events of low likelihood, which may reasonably occur, resulting in major negative effects on receptors. This approach directs the assessment to focus on “*low likelihood but potentially high consequence events*” such as a major spill, explosion, fire etc. Smaller incidents (spills, sediment loss etc.) are addressed elsewhere in this EIAR in the relevant topic chapters. This chapter focuses on major events only.

In the context of Major Accidents and Disasters, the understanding of what constitutes a ‘significant’ effect uses the IEMA (2020) definition, which defines a “significant environmental effect” as one which “*could include the loss of life, permanent injury and temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration*”.

21.2.7.1 Assessment Methodology

In accordance with the approach presented in the IEMA Primer (IEMA, 2020), this assessment follows three stages (screening, scoping, assessment) as follows:

Chapter 21: Risks of Major Accidents or Disasters

- **Stage 1 Screening:** The IEMA Primer (2020) states that “during screening it should be sufficient to identify if a development has a vulnerability to major accidents and / or disasters and to consider whether a development could lead to a significant effect.”
- **Stage 2 Scoping:** Stage 2 Scoping aims to provide a more detailed determination as to whether there is potential for significant effects. The IEMA Primer (2020) states that the assessment of impacts in relation to major accidents and/or disasters may be scoped out if it can be shown that:
 - “There is no source-pathway-receptor linkage of a hazard that could trigger a major accident and/or disaster or potential for the scheme to lead to a significant environmental effect”.
 - “All possible major accidents and/or disasters are adequately covered elsewhere in the assessment or covered by existing design measures or compliance with legislation and best practice.”

The Primer further notes that:

- “A major accident and/or disasters assessment will be relevant to some developments more than others, and for many developments it is likely to be scoped out of the assessment.”
- **Stage 3 Assessment:** The assessment stage provides further understanding on the likelihood of a risk event occurring and identifies the requirement for further mitigation. If hazard types are screened in at Stage 2, they are brought forward to Stage 3 for detailed consideration. The following exercises are carried out in the Stage 3 Assessment:
 - Setting out the baseline: Hazard identification and receptor tagging.
 - Assessment:
 - Identifying reasonable worst-case impact.
 - Selecting the grouped risk events that need further assessment.
 - Understanding the likelihood of a risk event occurring.
 - Mitigation: Identifying the requirements for secondary mitigation.

21.2.7.2 Risk Classification Approach

The potential risk of identified hazards brought forward to the Stage 3 assessment are evaluated using criteria outlined in **Table 21-2** (likelihood of occurrence), **Table 21-3** (consequence of impact) and **Table 21-4** (risk assessment), which have been adapted from the following:

- Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022)
- A National Risk Assessment for Ireland 2020 (DoD, 2021)
- Major Accidents and Disasters in EIA: A Primer (IEMA & ARUP, 2020)

Table 21-2: Classification of Likelihood of Occurrence

Rating	Classification	Description
1	Extremely Unlikely	100 or more years between occurrences
2	Very Unlikely	51-100 years between occurrences
3	Unlikely	11-50 years between occurrences
4	Likely	1-10 years between occurrences
5	Very Likely	Ongoing/Less than one year between occurrences

Chapter 21: Risks of Major Accidents or Disasters

Table 21-3: Consequence of Impact

Rating	Classification of Potential Impact (DoD, 2021)	Significance of Effects (EPA, 2022)	Description
1	Very Low Impact	Slight	<ul style="list-style-type: none"> • People: Deaths less than 1 in 250,000 people for population of interest OR Critical injuries/illness less than 1 in 250,000 OR Serious injuries less than 1 in 100,000 OR Minor injuries only. • Environment: Simple, localised contamination only. • Economic: Up to 1 % of Annual Budget. • Social: Limited disruption to community.
2	Low Impact	Moderate	<ul style="list-style-type: none"> • People: Deaths greater than 1 in 250,000 people for population of interest OR Critical injuries/illness greater than 1 in 250,000 OR Serious injuries greater than 1 in 100,000. • Environment: Simple, regional contamination, effects of short duration. • Economic: Greater than 1 % of Annual Budget. • Social: Community is functioning but with considerable inconvenience.
3	Moderate	Significant	<ul style="list-style-type: none"> • People: Deaths greater than 1 in 100,000 people for population of interest OR Critical injuries/illness greater than 1 in 100,000 OR Serious injuries greater than 1 in 40,000. • Environment: Heavy contamination, localised effects of extended duration. • Economic: Greater than 2 % of Annual Budget. • Social: Community is functioning poorly.
4	High Impact	Very Significant	<ul style="list-style-type: none"> • People: Deaths greater than 1 in 40,000 people for population of interest OR Critical injuries/illness greater than 1 in 40,000 OR Serious injuries greater than 1 in 20,000. • Environment: Heavy contamination, widespread effects of extended duration. • Economic: Greater than 4 % of Annual Budget. • Social: Community only partially functioning.
5	Very High Impact	Profound	<ul style="list-style-type: none"> • People: Deaths greater than 1 in 20,000 people for population of interest OR Critical injuries/illness greater than 1 in 20,000. • Environment: Very heavy contamination, widespread effects of extended duration. • Economic: Greater than 8 % of Annual Budget. • Social: Community is unable to function without significant support.

Hazards are evaluated and categorised using a risk matrix, developed using the approach and information outlined in both the national risk assessment documents, provisions outlined in the IEMA Primer, and the EPA Guidelines. This matrix is used to determine the level of significance of each risk for each hazard scenario.

Risks have been grouped in three categories outlined in **Table 21-4**; red refers to 'High Risk' scenarios that have an assessment score between 15 and 25, orange refers to 'Medium Risk' scenarios that score between 8 and 12, and green refers to 'Low Risk' scenarios scoring between 1 and 6.

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Chapter 21: Risks of Major Accidents or Disasters

Table 21-4: Risk Matrix

		Consequence of Impacts				
		1-Slight	2-Moderate	3-Significant	4-Very Significant	5-Profound
Likelihood	5-Very Likely	5	10	15	20	25
	4-Likely	4	8	12	16	20
	3-Unlikely	3	6	9	12	16
	2-Very Unlikely	2	4	6	8	10
	1-Extreme Unlikely	1	2	3	4	5

21.2.8 Consultations

Comments and queries from stakeholders informed design and are addressed throughout this report and summarised in **Table 21-5**.

Table 21-5: Summary of Key Consultation Issues Raised

Consultee	Comment/Issue	Response within Chapter
Geological Survey of Ireland	"Geohazards can cause widespread damage to landscapes, wildlife, human property and human life. In Ireland, landslides, flooding and coastal erosion are the most prevalent of these hazards. We recommend that geohazards be taken into consideration, especially when developing areas where these risks are prevalent, and we encourage the use of our data when doing so."	Geohazards are addressed in Section 21.3 .

21.3 Risk Assessment

21.3.1 Screening

The Proposed Scheme has been screened in for the consideration of major accidents and/or disasters. This is based on the nature and scale of the Proposed Scheme, the construction and operational activities, and the sensitivity of the receiving environment in relation to the River Moy and its tributaries. It is conceivable (although highly unlikely) that:

- The Proposed Scheme could result in a major accident and/or disaster.
- The Proposed Scheme could interact with other (non-scheme related) sources of hazards or events that could conceivably make it vulnerable to a major accident and/or disaster.
- Should an external (non-scheme related) major accident and/or disaster occur, the Proposed Scheme could conceivably exacerbate the risk of significant (negative) impacts associated with same.

21.3.2 Scoping

As a starting point for Stage 2 Scoping, the broad categories in the National Risk Assessment for Ireland 2023 were considered (including strategic headings of transportation, technical, natural/environmental, geopolitical and social/economic), along with scheme-specific risks and hazards noted throughout the specialist **Chapters 6-19** in the EIAR. Based on the thorough list of categories and events identified, a number were scoped out for the following reasons:

- a. The potential residual effects for the Proposed Scheme are predominantly not significant.

Chapter 21: Risks of Major Accidents or Disasters

- b. There is sufficient mitigation considered through design and/or there is recognised minimum design standards which have been applied to the design element to consider the hazard not significant.
- c. Hazards without a relevant environmental receptor are discounted as they lacked a source-pathway-receptor linkage.

Hazards considered to have potential significant environmental impact, with a source-pathway-receptor linkage to an environmental receptor were carried to Stage 3 – Assessment.

Table 21-6 and **Table 21-7** identifies the potential sources of hazard for the Proposed Scheme at construction and operational phase, respectively.

Chapter 21: Risks of Major Accidents or Disasters

Table 21-6: Stage 2 – Scoping Assessment for Major Accidents and/or Disasters: Construction Phase

Hazard Type	Scoping Assessment	Potential Receptor	Scoping Outcome
Transportation			
Major Construction Road Traffic Accident	<ul style="list-style-type: none"> There is no risk from the Proposed Scheme to cause a major road traffic accident in Ballina or along haulage routes during the construction phase as a result of increased levels of construction traffic and HGVs on motorways, urban and rural roads. There is no risk to the Proposed Scheme from the existing traffic in Ballina. 	<ul style="list-style-type: none"> Human Health Population 	Scoped Out for Further Assessment: A total of seven roads were assessed as having 'High' impact on traffic flows due to the additional traffic generated from the construction of the Proposed Scheme, however, with mitigation measures the effects are assessed as not significant. The traffic hazards at construction phase have been assessed and mitigated in Chapter 6: Traffic and Transportation .
Rail, Aviation, Ferries, Boat River Cruises	<ul style="list-style-type: none"> There may be a risk for the Proposed Scheme to impact paddle boarders, pleasure boat user and water sport activities during the Construction Phase. Wall failures are possible to occur which may cause damage to recreational users of the River Moy. There is no risk to the Proposed Scheme from the rail, aviation and boats. 	<ul style="list-style-type: none"> Population Human Health 	Scoped In for Further Assessment: There is potential for flood wall failure to occur during construction and causing risk to water leisure activities. See Table 21-8 for further assessment.
Economic			
Fiscal	N/A	<ul style="list-style-type: none"> N/A 	N/A
Impact on Critical Utilities / Infrastructure	<p>Works will be required both directly to, and in, the vicinity of existing utilities. The Proposed Scheme includes for local service diversions:</p> <ul style="list-style-type: none"> There is a risk from the Proposed Scheme to cause damage /disruption to critical Infrastructure (existing overground and underground utilities) during the construction phase, notably water mains, gas lines, electricity and telecommunications. This could lead to interruption of critical services, contamination of drinking water, or potential fatalities. Potential impacts onto local data flows, storage and security/ 	<ul style="list-style-type: none"> Population Human Health Material Assets: Waste and Utilities 	<p>Scoped Out for Further Assessment: Critical infrastructure hazards at construction phase have been assessed and mitigated in Chapter 16: Material Assets: Waste and Utilities. This identifies the nature and location of above ground and underground services and informs the design in terms of relocation/modification of services.</p> <p>Mitigation includes:</p> <ul style="list-style-type: none"> All existing services will be confirmed prior to construction using service records, further Ground Penetrating Radar (GPR) surveys and slit trenches to ensure that their position is accurately identified before excavation works commence across all sections of the Proposed Scheme. Enabling works on utilities shall be programmed to maintain connections, or at least minimise downtimes, to public and private customers where conflicts arise. Early consultation shall be undertaken with service providers to enable providers to reroute their service during non-peak periods to maintain connections to customers.

Chapter 21: Risks of Major Accidents or Disasters

Hazard Type	Scoping Assessment	Potential Receptor	Scoping Outcome
			<ul style="list-style-type: none"> • For unknown utilities encountered during construction works, further liaison with utility providers will be required to establish the preferred solution. • Where diversions, or modifications are required to utility infrastructure: <ul style="list-style-type: none"> – It will be planned in advance by the appointed contractor and adequate notice (not less than 14 days) will be given to all impacted properties. – Notification shall include information on when interruptions and works are scheduled to occur and the duration of such interruption. Any required works will be carefully planned by the appointed contractor to ensure that the duration of interruptions is minimised as far as is practicable. • Where works are required in and around known utility infrastructure, precautions will be implemented by the appointed contractor to protect the infrastructure from damage and avoid unplanned interruptions. • Any damage to services as a result of the Proposed Scheme shall be repaired / replaced without delay. • Safety procedures will be put in place to minimise the risk to utility provider personnel and the general public during works on services. Protection measures during construction will include warning signs and markings indicating the location of utility infrastructure, safe digging techniques in the vicinity of known utilities, and in certain circumstances where possible, isolation of the section of infrastructure during works in the immediate vicinity. • Alternative connections shall be provided before any connections are severed. Supply to existing services will be maintained as far as possible during construction. • All proposed relocation / diversion works shall be delivered through the appropriate service provider processes e.g. Uisce Eireann Developer Services – Diversion process. • Works effecting underground services shall be carried out strictly in accordance with the Health and Safety Authority <i>Code of Practice for Avoiding Danger from Underground Services</i> Invalid source specified. • Works affecting electricity services must also be carried out strictly in accordance with the <i>Code of Practice for Avoiding Danger from Overhead Electricity Lines</i> Invalid source specified. Where construction equipment passes under lines, goalpost barriers will be established within a lateral distance of 6 m either side of the line, ensuring that tall vehicles will not come into contact with OHLs during construction. A no-tip zone will also be established within 10 m of power lines. All proposed poles will be placed at a sufficient distance from proposed earthworks.
			<p>The measures included are sufficient to reduce the risks to appropriate levels for the nature of the Proposed Scheme.</p>

Chapter 21: Risks of Major Accidents or Disasters

Hazard Type	Scoping Assessment	Potential Receptor	Scoping Outcome
Inflation and higher interest rates	N/A	N/A	N/A
Deglobalisation	N/A	N/A	N/A
Meteorological Risk			
Release of Pollutants into Surface and Groundwater Bodies, Water Supplies and Sensitive Ecological Receptors	Works near water pose a risk to the environment, namely from accidental spillage or release of contaminated materials. The scheme area is located within drinking water (groundwater) area, IE_WE_G_0035. The environment would be sensitive to accidental spill due to the human health and ecological impacts.	<ul style="list-style-type: none"> • Human Health • Population • Water • Biodiversity 	<p>Scoped Out for Further Assessment: The mitigation measures detailed in Chapter 12: Water are anticipated to reduce the residual effects to not significant/imperceptible.</p> <p>The following water management measures will be followed, to limit cementitious particles from entering watercourses by:</p> <ul style="list-style-type: none"> • Having dedicated, suitably prepared concrete washout areas for concrete chute and bowser washout, and cleaning of concrete contaminated plant and materials. Signs will be erected at works sites to inform concrete delivery drivers that washout is not permitted outside these areas. • Ensuring disposal of raw or uncured waste concrete is controlled using approved waste disposal and/or concrete wash-out pits to ensure that seepage to drains from the site is avoided. • Water collected in wash pits will be tankered off-site for treatment at an appropriate licensed facility, ensuring none is allowed to overflow or infiltrate to ground. • Employing best practice in bulk-liquid concrete management addressing pouring and handling, secure shuttering / formwork, ensuring adequate curing times. Where shuttering is used, measures will be put in place to prevent against shutter failure and control storage, handling and disposal of shutter oils. • Treating cement-laden runoff and dewatering effluent in settling tanks before allowing discharge to watercourses. • Dust suppression using water sprayers during demolition of quay walls or other activities resulting in the creation of cement dust. <p>The following water management measures will be followed, to limit hydrocarbons from entering watercourses by:</p> <ul style="list-style-type: none"> • Training operatives in the use of spill kits and keeping spill kits at each work site. • Ensuring all fuels and oils are stored in bunded trays at least 20 m from any watercourses or surface water feature. Trays will be bunded to 110% of the capacity of the fuel volume. • Runoff from construction plant washdown to be collected and passed through an oil-water separator before release into the environment.

Chapter 21: Risks of Major Accidents or Disasters

Hazard Type	Scoping Assessment	Potential Receptor	Scoping Outcome
			<ul style="list-style-type: none"> • Staff parking to be restricted to designated areas (refer to Chapter 6: Traffic & Transportation). • Refuelling activities to be restricted to designated, bunded areas, at least 20 m from any watercourse or surface water feature. • All construction plant to be regularly maintained and checked for oil and fuel leaks before use. Drip trays to be available on site. • Consideration to be given to the use of biodegradable fuels and oils, where possible. <p>The ECoW will carry out the following monitoring activities during the construction phase:</p> <ul style="list-style-type: none"> • All water quality protection mitigation/ control measures shall be inspected daily by the ECoW during specific construction area working days with any maintenance and repairs carried out immediately. • All environmental monitoring and checklists shall be recorded and added to the CEMP on a daily basis. • The ECoW will collect samples once weekly (e.g., Tuesday) to be tested for suspended solids at locations upstream and downstream of each discrete construction work area on the River Brusna and River Moy (as these are the more sensitive receptors). The downstream sampling point must be in the main channel below the mixing zone for the potential works area run-off so as to reflect assimilated concentrations. The sampling day cannot be altered based on weather conditions, as this will ensure capture of a random sample of rainfall and flow conditions. • In addition, the ECoW will target a minimum of two high flow events per month and sample suspended solids upstream and downstream of each active works zone. This is to provide an efficacy record for sediment loss control measures during times of active rainfall. • The ECoW must tabulate the once weekly upstream and downstream suspended solids results for the freshwater River Moy and the Brusna (Glenree) River as these are the more sensitive receptors. The rolling average of downstream (mixed) suspended solids concentration must not exceed 10 mg/l if the upstream concentration is $\leq 100\text{mg/l}$. Suspended solids concentration downstream must not exceed 5% of the upstream level if the upstream concentration is $>100\text{mg/l}$. • If the emerging rolling average is exceeding these thresholds, then The ECoW will have powers to stop works and instruct additional efforts to be made to reduce suspended sediment sources and control pathways by strengthening the sediment control measures as set out in the CEMP.

Chapter 21: Risks of Major Accidents or Disasters

Hazard Type	Scoping Assessment	Potential Receptor	Scoping Outcome
Extreme Weather – Flood Events and Storm Surges	<p>Some construction will be undertaken within the floodplain of the River Moy, and there will be a temporary loss of upstream flood storage and increased conveyance by the removal of the existing flood defences for the establishment of new defences:</p> <ul style="list-style-type: none"> • There is a risk from the Proposed Scheme to exacerbate the effects of extreme flood events during the construction phase by restricting flood storage availability, channel conveyance and rebuilding the flood wall in various locations, see Section 12.4.1.3 for a more in-depth analysis. There is a potential risk to the safety of construction site workers, plant/construction equipment, local residents and vehicle users, particularly around the Moy section. • There is a risk of flood defence failure and the inherent residual risk if an event greater than the SoP occurs. 	<ul style="list-style-type: none"> • Water • Biodiversity • Population • Human Health 	<p>The following measures will ensure soil and groundwater and adjacent watercourses remain free from pollution:</p> <ul style="list-style-type: none"> • Ensuring that all areas where liquids (including fuel) are stored, or cleaning is carried out, are in designated impermeable areas that are isolated from the surrounding area and within a secondary containment system, e.g., by a roll-over bund, raised kerb, ramps or stepped access. • The location of any fuel storage facilities shall be considered in the design of the construction compounds. These are to be designed in accordance with relevant guidelines and codes of best practice and will be fully bunded. • Good housekeeping at the site (daily site clean-ups, use of disposal bins, etc.) during the entire construction phase. • Spill kit to be provided and to be kept close to the storage area. Staff to be trained on how to use spill kits correctly. <p>Scoped In for Further Assessment: The Proposed Scheme is vulnerable to flooding. See Table 21-8 for further information on the assessment.</p>
Extreme Cold Weather – Snow and Ice	<ul style="list-style-type: none"> • There is considered to be no risk from the Proposed Scheme to exacerbate cold weather events during the construction phase. 	<ul style="list-style-type: none"> • Population • Human Health 	<p>Scoped In for Further Assessment: The newly set concrete flood wall will be vulnerable to water entering cracks and expanding during freezing. See Table 21-8 for further information on the assessment.</p>

Chapter 21: Risks of Major Accidents or Disasters

Hazard Type	Scoping Assessment	Potential Receptor	Scoping Outcome
	<ul style="list-style-type: none"> The concrete used for the flood wall is considered vulnerable to the cold weather and withstanding expansion of water as it freezes. 		
Epidemic and Pandemic Accidents; Food Situation Crisis			
Antimicrobial Resistance	N/A	N/A	N/A
Food Safety and Security	N/A	N/A	N/A
Geological Hazard			
Geohazards (Earthworks Failure / Landslide / Slope Instability)	<p>Potential impacts include settlement of the altered ground profile and slope instability during excavation and construction of the earth/rock embankment. Temporary stockpiles of soil and rock may also be required during construction.</p> <ul style="list-style-type: none"> No risks are foreseen from the Proposed Scheme to cause a major accident and/or disaster from earthworks or stockpile slope instability, causing failure or landslide during the construction phase. The Study Area is rated as having a 'low' susceptibility to landslides¹ (see Chapter 11: Land, Soil, Geology and Hydrogeology for details). There are no records of landslides occurring within the study area. The Proposed Scheme has potential to experience damage in the extremely unlikely event if a landslide were to occur. 	<ul style="list-style-type: none"> Land, Soils, Geology and Hydrogeology Human Health Population 	<p>Scoped Out for Further Assessment: The geotechnical hazards at construction phase have been assessed and mitigated through design. The following design measures has been included:</p> <ul style="list-style-type: none"> Soft soils will be removed during the construction of the foundation to create a stable base and a geotextile membrane placed over the formation to strengthen the foundation. If a high-water table is encountered during excavation an appropriate backfill such a Class 6A material will be incorporated. Embankments will be constructed of suitable compacted materials, tamped down and reseeded immediately to ensure stability and to minimise the potential for erosion of sediments into the adjacent Brusna River and Tullyegan Stream. To prevent suspended sediment runoff a barrier method such as a sediment barrier or silt fence will be placed on the river side of the embankment. Permanent cut-off ditches on the land side of the embankment will be used to prevent over land flow. Ensuring that a Construction Environmental Management Plan (CEMP) is in place will mitigate any risks associated with embankment construction activities, thus reducing these impacts to an Imperceptible level. <p>The following monitoring measures are proposed to reduce the risk of earthwork failures:</p>

¹ GSI (n.d) Geological Survey Ireland Spatial Resources. Available at: <https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228>

Chapter 21: Risks of Major Accidents or Disasters

Hazard Type	Scoping Assessment	Potential Receptor	Scoping Outcome
			<ul style="list-style-type: none"> The appointed contractor shall monitor settlement every two to three days using settlement plates during and after embankment construction at Rathkip and Shanaghy and along the Tullyegan Stream. <p>The measures included are sufficient to reduce the risks to imperceptible for the nature of the Proposed Scheme.</p>
Technological			
Disruptive Technology	N/A	N/A	N/A
Cybersecurity	N/A	N/A	N/A
Industrial Accident			
Chemical - Accidents at Seveso Sites / COMAH Establishments	<p>European Refreshments t/a Ballina Beverages is an upper tier COMAH establishment which stores several dangerous substances. It is located within the Study Area is approximately 350 m from the River Moy SAC. The Proposed Scheme infrastructure is outside the site's consultation distance:</p> <ul style="list-style-type: none"> There is not a significant risk from the Proposed Scheme to increase the risk of a major accident during the construction phase. The Proposed Scheme is located outside the consultation distance of the Seveso Site and so it should not interfere with the use and storage of flammable substances such as fuel at construction compounds. 	<ul style="list-style-type: none"> Human Health Population Air Quality 	<p>Scoped Out for Further Assessment: The hazard arises from a third-party site and requires coordination with the Proposed Scheme to manage risk to an acceptable level and are subject to management under the Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015 (COMAH regulations). Measures have been outlined in 'Release of Pollutants into Surface and Groundwater Bodies, Water Supplies and Sensitive Ecological Receptors' outcome to reduce significance of spillage. Moreover, an Environmental Incident and Emergency Response Plan and evacuation procedure for all works areas will be integrated into the design.</p> <p>The Proposed Scheme lays outside of the 200 m Consultation Distance. The Consultation Distance is the area within which there is potential for significant consequences for human health and the environment from a major accident at the Seveso Site and can also have significant consequences to Proposed Developments².</p>
Collapse / Damage to Structures	A section of the flood wall between the salmon weir and the Ballina Manor Hotel will be constructed from a temporary ramp, demolition of existing flood walls on the banks of the River Moy.	<ul style="list-style-type: none"> Human Health Population 	<p>Scoped In for Further Assessment: The use of the crane is vulnerable to extreme weather conditions which could lead to an accident/ disaster for human life and environmental conditions; see Table 21-8.</p>

² Mayo County Council (2021) External Emergency Plan: European Refreshments t/a Ballina Beverages. Available at: <https://www.mayo.ie/getmedia/b6aba3be-4213-409d-bbf1-4bc9d0337220/European-Refreshments-EEP-Public-final.pdf>

Chapter 21: Risks of Major Accidents or Disasters

Hazard Type	Scoping Assessment	Potential Receptor	Scoping Outcome
	<p>A crane will be required to transport materials to be transported in from the Upper Bridge:</p> <ul style="list-style-type: none"> There is a risk from the Proposed Scheme to cause an accident and/or disaster from a flood wall collapse, which has the potential to damage existing structures/ utilities, injure construction workers during the construction phase or to lead to environmental damage to biodiversity and water quality. There is a potential risk for structural collapse to occur from the crane crossing the upper bridge or toppling over damaging the upper bridge, causing critical injury / mortality of residents, destroying / damaging critical services and utilities. 	<ul style="list-style-type: none"> Material Assets: Waste and Utilities Biodiversity 	
Social Risk	N/A	N/A	N/A
Geopolitical	N/A	N/A	N/A

Table 21-7: Stage 2 – Scoping Assessment for Major Accidents and/or Disasters: Operational Phase

Hazard Type	Scoping Assessment	Potential Receptor	Scoping Outcome
Transportation			
Major Road Traffic Accident	<ul style="list-style-type: none"> There is considered to be no risk from the Proposed Scheme in terms of major road traffic accidents during the operational phase. The risk of major traffic accidents occurring during the operational phase of the Proposed Scheme would then be no different to other national routes. The only additional frequency of traffic will be associated with the maintenance which will likely include a single vehicle every 3 months. The Proposed Scheme is not considered vulnerable to traffic during the Operational Phase. 	<ul style="list-style-type: none"> Human Health Population 	Scoped Out for Further Assessment: As an FRS, the proposed design will not have a significant impact on traffic during the operational phase.
Environmental Risk			
Release of Pollutants into Surface and Groundwater	Four pumping stations are proposed to be incorporated across the Proposed Scheme.	<ul style="list-style-type: none"> Water 	Scoped Out for Further Assessment: A petrol interceptor will be fitted to surface water pumping stations out falling to the River Moy to mitigate against hydrocarbons entering the watercourse during pumping; Regular emptying and cleaning of the petrol interceptors will be conducted.

Chapter 21: Risks of Major Accidents or Disasters

Hazard Type	Scoping Assessment	Potential Receptor	Scoping Outcome
Bodies, Water Supplies, Sensitive Ecological Receptors	<ul style="list-style-type: none"> The Proposed Scheme has potential to release pollutants as a result of damage to petrol inceptors/pumping stations. The Proposed Scheme is vulnerable to other sources or activity leading to risk of spillage, leading to accidental spills. Shellfish farm located in Killala Bay could have economic and human health effects to the population. 	<ul style="list-style-type: none"> Land, Soils, Geology and Hydrogeology Biodiversity Human Health 	<p>Quarterly inspections of the pumping station will be conducted to ensure repairs are completed before an accident occurs.</p> <p>The following monitoring measures will be performed:</p> <ul style="list-style-type: none"> The EPA will continue to monitor water quality at the existing locations during the operational phase of the Proposed Scheme as part of its WFD obligations. <p>Moreover, with the proposed mitigation measures in conjunction with the length of the Killala Bay and distance from the Killala Bay, it would be unlikely for contaminants to reach the Shellfish farm.</p> <p>If pumping station failure were to occur, it would be expected that conditions would revert back to baseline conditions.</p> <p>These measures included are sufficient to reduce the risks to appropriate levels for the nature of the Proposed Scheme.</p>
Extreme Weather - Flood Events and Storm Surges	<ul style="list-style-type: none"> There is no risk from the Proposed Scheme to exacerbate/intensify extreme flood events during the operational phase. The purpose of the Proposed Scheme will be to reduce the intensity of flooding. There is a risk to the Proposed Scheme to be impacted from storm / floods which may damage the pumping stations and cause failure, contributing to flooding within the flood walls. 	<ul style="list-style-type: none"> Water Biodiversity Human Health 	<p>Scoped Out for Further Assessment: The Proposed Scheme will reduce the risk and intensity of flooding events. In the event of pumping station failure, the effect would be considered very low impact as there is no storage capacity associated with the pumping station. It would cause puddling to occur along the manholes and a plug-in generator will be available to reduce the effect.</p> <p>To mitigate against pumping station failure, the following measures will be deployed:</p> <ul style="list-style-type: none"> Biannual inspections of pumping stations will be completed. Repairs will be performed as required. <p>With the nature of the Proposed Scheme in conjunction with the measures in place to ensure there pumping station failure does not occur, there is considered to be a very unlikely risk of a major accident to occur.</p>
Antimicrobial Resistance	N/A	N/A	N/A
Food Safety and Security	N/A	N/A	N/A
Technological			
Disruptive Technology	N/A	N/A	N/A
Cybersecurity	N/A	N/A	N/A

Chapter 21: Risks of Major Accidents or Disasters

Hazard Type	Scoping Assessment	Potential Receptor	Scoping Outcome
Chemical - Accidents at Seveso Sites / COMAH Establishments	<p>The Proposed Scheme is outside the 200 m consultation distance of the Seveso site, European Refreshments t/a Ballina Beverages:</p> <ul style="list-style-type: none"> The Proposed Scheme is unlikely to exacerbate the effects of an accident occurring to the nearby COMAH establishment. In the event of a fire, petrol inceptors located along the roads adjacent to the River Moy outside the consultation distance. The Proposed Scheme is not expected to be impacted by the COMAH establishment as it lays outside of the 200 m consultation distance around its site. 	<ul style="list-style-type: none"> Population Human Health Material Assets: Waste and Utilities Air Quality 	<p>Scoped Out: There is unlikely to be any interactions with the COMAH site and the Proposed Scheme during the operational phase. Any hazard arising from the third-party site will be addressed within the site emergency management and Environmental Incident and Emergency Response Plan, which should manage risk to an acceptable level. Moreover, the Proposed Scheme is outside the consultation distance.</p>
Collapse / Damage to Structures	<ul style="list-style-type: none"> There is considered to be no risk from the Proposed Scheme in terms of flood wall damage/ failure during operational phase. The infrastructure of the Proposed Scheme is not considered vulnerable to damage or failure from activities or developments undertaken in the wider area. 	<ul style="list-style-type: none"> Human Health Population Biodiversity Water Quality 	<p>Scoped Out: The flood defences have been designed in line with all relevant design standards.</p> <ul style="list-style-type: none"> Regular inspections (annually) will be conducted, and repairs will be completed as required. <p>The measures included are sufficient to reduce the risks to appropriate levels for the nature of the Proposed Scheme.</p>
Social	N/A		N/A
Geopolitical	N/A	N/A	N/A
Economic	N/A	N/A	N/A

21.3.3 Stage 3 - Assessment

The Stage 3 assessment involves a more detailed appraisal of the shortlist of major events or hazards identified and assessed during Stage 2 Scoping. In some cases, events or hazards scoped into Stage 3 may mean that these risks need to remain on the design risk register until closed out through design.

The shortlist and assessment of those events and/or hazards scoped in for Stage 3 are presented in **Table 21-8**. Events and hazards are assessed based on their likelihood and impact and resulting level of significance, and scored and ranked as Low, Medium or High (based on the process outlined in **Section 21.2.7**).

Chapter 21: Risks of Major Accidents or Disasters

Table 21-8: Stage 3 – Assessment for Major Accidents and/or Disasters

Hazard Type	Source and/or Pathway Receptor Linkage	Reasonable worst consequence if event did occur	Mitigation	Risk Evaluation Likelihood	Consequence of Impact	Risk Score (Likelihood x Consequence) High Risk 15 to 25 Med Risk 8 to 12 Low Risk 1 to 6	Secondary Mitigation Required?
<p>Extreme Cold Weather – Snow and Ice</p>	<p>Construction Phase:</p> <ul style="list-style-type: none"> Newly set concrete will be vulnerable to cold. Potential for the freezing of water that enters the cracks to weaken the wall’s integrity. This could lead to a collapse potentially injuring construction workers, members of the public, damaging wildlife and water quality 	<p>Damage to aquatic biodiversity.</p>	<ul style="list-style-type: none"> With regard to extreme weather events such as severe snowfall, blizzard and hailstorm events, or prolonged cold weather events, the Proposed Scheme has been designed to operate under a range of environmental conditions in accordance with all relevant local authority and TII standards. In addition, where weather emergencies are judged to impact public safety at national level, the National Emergency Coordination Group (NECG) is activated by the Office of Emergency Planning. <p>The following measures will be used to raise the temperature of concrete:</p> <ul style="list-style-type: none"> Heating the mixing water and/or aggregates, Use of insulated formwork. Top surfaces covered with insulating materials. Prior to construction, weather forecasts will assist with planning on when to begin construction of the flood wall to ensure. 	<p>2. Very Unlikely</p>	<p>3-Significant</p>	<p>6. Low</p>	<p>No</p>

Chapter 21: Risks of Major Accidents or Disasters

Hazard Type	Source and/or Pathway Receptor Linkage	Reasonable worst consequence if event did occur	Mitigation	Risk Evaluation	LikelihoodConsequence of Impact	Risk Score (Likelihood x Consequence) High Risk 15 to 25 Med Risk 8 to 12 Low Risk 1 to 6	Secondary Mitigation Required?
<p>Extreme Weather – Flood Events and Storm Surges</p>	<p>Construction and Operational Phase Flood defence failure may give rise to a major risk if it coincided with a flooding event. Flooding greater than the SoP could cause significant risk</p>	<ul style="list-style-type: none"> • Damage to critical utilities, property. • Injury to public. 	<ul style="list-style-type: none"> • Compaction of concrete will be important to ensure air and water does not enter gaps. • Checking water levels at Rahan’s gauge on a daily basis or hourly during times of high flow. • Monitoring tide forecast. • Developing an emergency response and evacuation procedure for all works areas including removal of potential contaminants and construction plant. • The timing of the instream works will reduce the likelihood of a high flow event occurring while they are taking place, minimising the potential increase in flood risk by occupation of the floodplain. • To minimise temporary reductions in floodplain storage on the Brusna, the instream works area cofferdam will have a top-level equivalent to the 50 % AEP event. The sequencing will be such that the bridge parapet will be installed before the scour protection. • Design includes assumptive and adaptive measures for Climate Change. 	<p>2. Very Unlikely</p>	<p>3. Significant</p>	<p>6. Low</p>	<p>No</p>

Chapter 21: Risks of Major Accidents or Disasters

Hazard Type	Source and/or Pathway Receptor Linkage	Reasonable worst consequence if event did occur	Mitigation	Risk Evaluation LikelihoodConsequence of Impact		Risk Score (Likelihood x Consequence) High Risk 15 to 25 Med Risk 8 to 12 Low Risk 1 to 6	Secondary Mitigation Required?
			<ul style="list-style-type: none"> Best construction practice will be performed to reduce the likelihood of this. 				
Collapse / Damage to Structures	Construction Phase Transporting material requires cranes to operate off the Upper Bridge of the River Moy. Extreme weather has potential to impact on cranes.	<ul style="list-style-type: none"> Crane collapse and damage resulting in injury or death to site workers / general public. Damage to existing structures/ infrastructure/ utilities (e.g. overhead lines). 	<ul style="list-style-type: none"> Health and safety measures, guidelines, and standards will be adhered to in relation to the movement and operation of cranes. Cranes will not be operated where orange or red wind or flood risk weather warnings are in place affecting Ballina. The fall-zone for the crane will be mapped and actions identified to ensure any occupied properties within the fall zone can be alerted. The plan will also identify emergency measures to manage access to roads, towpaths etc. within the impact zone during high-risk weather conditions. 	2 – V. Unlikely	3 – Significant	6 – Low	No
Rail, Aviation, Ferries, Boat River Cruises	Construction and Operational Phase Flood defence failure could cause paddle boarders, pleasure boat user and water sport activities.	<ul style="list-style-type: none"> Serious injury to paddle boat users, pleasure boat users. 	<p>Construction Phase</p> <ul style="list-style-type: none"> Best Construction Methodology will be implemented. <p>Operational Phase</p> <ul style="list-style-type: none"> Annual inspections of flood walls. Repairs will be undertaken as required. 	2. V. Unlikely	2. Moderate	4 - Low	No

Chapter 21: Risks of Major Accidents or Disasters

21.4 Assessment of Effects

Based on the risk assessment conducted in **Section 21.3** it can be concluded that the likelihood of the Proposed Scheme to cause a Major Accidents and/ or Disasters during construction or operational phases is not expected to be significant.

21.5 Mitigation Measures

21.5.1 Construction Phase

- See **Section 6.5.1 of Chapter 6: Traffic & Transportation** for mitigation measures to be implemented during the construction phase to combat effects for major risks to arise from traffic collisions.
- See **Section 16.5.1 of Chapter 16: Material Assets: Waste and Utilities** for measures to be implemented to combat likelihood and effect significance to critical utilities/ infrastructure during the construction phase.
- See **Section 9.5.1 of Chapter 9: Aquatic Biodiversity** for relevant measures to be implemented to combat the likelihood and effect significance for concrete loss and general hydrocarbon loss controls.
- See **Section 11.5.1 of Chapter 11: Land, Soils, Geology and Hydrogeology** for relevant measures to be implemented to combat the likelihood and effect significance for Earthworks Failure/ Slope Instability.
- See **Section 12.5.1 of Chapter 12: Water** for relevant measures to be implemented to combat the likelihood and effect significance for flood events.

The following measures will be used to raise the temperature of concrete:

- Heating the mixing water and/or aggregates,
- Use of insulated formwork.
- Top surfaces covered with insulating materials.
- Prior to construction, weather forecasts will assist with planning on when to begin construction of the flood wall to ensure.
- Compaction of concrete will be important to ensure air and water does not enter gaps.

The following measures will be implemented to avoid collapse / damage to structures:

- Health and safety measures, guidelines, and standards will be adhered to in relation to the movement and operation of cranes.
- Cranes will not be operated where orange or red wind or flood risk weather warnings are in place affecting Ballina.
- The fall-zone for the crane will be mapped and actions identified to ensure any occupied properties within the fall zone can be alerted. The plan will also identify emergency measures to manage access to roads, towpaths etc. within the impact zone during high-risk weather conditions.
- A CEMP will be developed by the contractor which will ensure that all mitigation and monitoring requirements as set out in the EIAR will be followed through the Construction Phase ensuring that risk does not increase overtime on the site and ensuring all potential risks are kept to as low as reasonably practicable. The CEMP will include an Environmental Incident and Response Plan (EIRP). The plan will contain details of emergency scenarios and relevant procedures and actions that will apply. The Contractor will communicate the plan as part of the site induction to all staff and visitors (See **Section 6** of the CEMP).

Chapter 21: Risks of Major Accidents or Disasters

21.5.2 Operational Phase

21.5.2.1 Release of Pollutants

- Regular emptying and cleaning of the petrol interceptor will be conducted. Quarterly inspections of the pumping station will be conducted to ensure repairs are completed before an accident occurs.
- The EPA will continue to monitor water quality at the existing locations during the operational phase of the Proposed Scheme as part of its WFD obligations.

21.5.2.2 Collapse / Damage to Structures

Annual inspections will be conducted, and repairs will be completed as required. All infrastructure implemented as part of the Proposed Scheme will be inspected after extreme weather events.

21.6 Residual Effects

21.6.1 Construction Phase

Following mitigation measures, it's predicted that the likelihood of major accidents and natural disasters arising as a result of the Proposed Scheme will be **unlikely to very unlikely** and as such the risk is **low**, in accordance with **Table 21-4**. The EIRP (forming part of the CEMP) will improve response times, thus limiting the magnitude of the potential effect.

21.6.2 Operational Phase

Following mitigation measures in conjunction with the nature of works required, it is predicted that major accidents arising as a result of the Proposed Scheme will be very unlikely. If they were to occur, they would impose **low risk**.

21.7 Monitoring

21.7.1 Construction Phase

See **Section 12.7.1 of Chapter 12: Water** for relevant monitoring measures to be implemented during the construction phase to combat effects for major risks to arise from accidental spills.

See **Section 11.7.2 of Chapter 11: Land, Soils, Geology and Hydrogeology** for relevant monitoring measures to be implemented during the construction phase to combat effects and likelihood for major risks to arise from earthwork failures.

An ERP will undergo monitoring, review and will be updated as necessary through the lifecycle of the Proposed Scheme. Moreover, the risks of major accidents and / or disasters will be assessed through detailed design, construction, and operational phase of the Proposed Scheme.

21.7.2 Operational Phase

See **Section 12.7.2 of Chapter 12: Water** and **Section 11.7.2 of Chapter 11: Land, Soils, Geology and Hydrogeology** for relevant monitoring measures to be implemented during the operational phase to combat effects for major risks to arise from accidental spills.

21.8 Chapter References

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