

Luas Finglas

Environmental Impact Assessment Report 2024

Chapter 22: Risk of Major Accident and Disasters

Table of Contents

GLOSSARY OF FREQUENTLY USED TERMS	iv
SECTION 22: Risk of Major Accident and Disasters	1
22.1 Introduction	1
22.1.1 Purpose of this Report	1
22.1.2 Outline Scheme Description	2
22.2 Risk of Major Accidents and / or Disasters	3
22.2.1 Definitions	5
22.3 Methodology	5
22.3.1 Scope and Context.....	5
22.3.2 Legislation, Guidelines and Reference Material	6
22.3.3 Risk Assessment Methodology	7
22.3.4 Description of Study Area	10
22.3.5 Survey Methodology	10
22.3.6 Consultation	10
22.4 Baseline	11
22.4.1 Sensitive Receptors	11
22.4.2 Seveso Sites	11
22.5 Potential Impacts	12
22.5.1 'Do Nothing' Scenario	12
22.5.2 Risk Evaluation	12
22.6 Mitigation and Monitoring Measures	19
22.6.1 Inherent Design	19
22.6.2 Plans and Procedures	19
22.6.3 Monitoring	24
22.7 Residual Impacts	25
22.8 Conclusion	25
22.9 Cumulative Impacts	25
22.10 Difficulties Encountered in Compiling Information	25
22.11 References	26

Appendices

Appendix A22.1: Hazard Identification Record

Appendix A22.2: Seveso Sites

List of Tables

Table 22-1: Overview of the Key Features of the proposed Scheme	2
Table 22-2: Summary of New Bridges of the proposed Scheme	3
Table 22-3: Risk Classification Table – Likelihood (DEHLG, 2010)	8
Table 22-4: Risk Classification Table – Classification of Consequence (DEHLG, 2010)	9
Table 22-5: Level of Significance	10
Table 22-6: Rating of Construction Phase MANDs in the Absence of Mitigation	13
Table 22-7: Rating of Operational Phase MANDs in the Absence of Mitigation	16
Table 22-8: Evaluation of Levels of Significance in the Absence of Mitigation	18
Table 22-9: MANDs – Construction Phase and Operational Phase Assessment of Mitigation Measures .	22
Table 22-10: Evaluation of Level of Significance - Post-Mitigation	24

GLOSSARY OF FREQUENTLY USED TERMS

Term	Definition
ALARP	As Low as Reasonably Practical
CDRWMP	Construction and Demolition Resource and Waste Management Plan
CEMP	Construction Environmental Management Plan
CIRIA	Construction Industry Research and Information Association
COMAH	Control of Major Accident Hazards
CRR	Commission for Railway Regulation
CTMP	Construction Traffic Management Plan
DCC	Dublin City Council
DECLG	Department of the Environment, Community and Local Government
DEHLG	Department of the Environment, Heritage and Local Government
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIRP	Environmental Incident Response Plan
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EPA	Environmental Protection Agency
EPR	Emerging Preferred Route
FCC	Fingal County Council
GWP	Global Warming Potential
HSA	Health and Safety Authority
IÉ	Iarnród Éireann
IEMA	Institute of Environmental Management and Assessment
ISMP	Invasive Species Management Plan
IPCC	Intergovernmental Panel on Climate Change
MANDs	Major Accidents and Disasters
PTMP	Preliminary Traffic Management Plan
PV	Photovoltaic
RBMP	River Basin Management Plan
RO	Railway Order
SWMP	Surface Water Management Plan
TII	Transport Infrastructure Ireland

SECTION 22: RISK OF MAJOR ACCIDENT AND DISASTERS

22.1 Introduction

22.1.1 Purpose of this Report

This Chapter of the Environmental Impact Assessment Report (EIAR) assesses the potential significant impacts of the Luas Finglas (hereafter referred to as the “proposed Scheme”), arising from its vulnerability to risks of major accidents and / or disasters during the Construction Phase and Operational Phase.

In accordance with the requirements of Directive 2011/92/EU as amended by Directive 2014/52/EU (Environmental Impact Assessment (EIA) Directive), it describes and assesses *‘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, paragraph 8 of the EIA Directive also provides that the EIAR should contain *‘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 available information and that 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”.

The assessment is based on a reasonably foreseeable worst-case scenario with respect to Major Accidents and Disasters (MANDs) arising from the proposed Scheme as described in Chapter 5 (Description of proposed Scheme) of this EIAR. The proposed Scheme description is based on the design prepared to inform the planning stage of the proposed Scheme and to allow for a robust assessment as part of the EIA process.

The underlying objective of considering the risk of MANDs is to ensure that appropriate precautionary measures are taken for those projects with a likelihood of creating *‘significant environmental impacts’* (Environmental Protection Agency (EPA) 2022) and with a focus on *‘low likelihood but potentially high consequence events’* in accordance with guidance provided by the Institute of Environmental Management and Assessment (IEMA, 2020) (hereafter referred to as the IEMA Primer). A further objective is to ensure that the EIAR identifies measures to mitigate harm that could arise from those unlikely scenarios and ensure that it addresses preparedness and response planning.

This Chapter outlines how the potential for MANDs (Recital 15 of Directive 2014/52/EU) relevant to the proposed Scheme have been identified and how those risks will be managed and/or controlled. Based on the requirements of the EIA Directive, this Chapter considers:

- The relevant MANDs, if any, that the proposed Scheme could be vulnerable to;
- The potential for these MANDs to result in likely significant adverse environmental effects on people and local communities, and the natural, built, and historic environments; and
- The existing and proposed mitigation and management measures to prevent and mitigate the likely significant adverse effects of such events on the environment.

This Chapter should be read in conjunction with the following Chapters and their Appendices, which expand upon aspects of the proposed Scheme:

- Chapter 9 (Biodiversity);
- Chapter 10 (Water);
- Chapter 11 (Land and Soils: Soils, Geology & Hydrogeology);
- Chapter 14 (Climate);

- Chapter 17 (Material Assets: Infrastructure and Utilities); and
- Chapter 25 (Summary of Mitigation Measures, Monitoring & Residual Impacts).

22.1.2 Outline Scheme Description

The proposed Scheme comprises a high-capacity, high-frequency light rail running from Broombridge to Charlestown, connecting Finglas and the surrounding areas with Dublin's wider public transport network by providing a reliable, and efficient public transport service to the city centre via Broombridge.

As shown in Volume 4 - Map Figure 1-1, starting from Broombridge, the proposed Scheme travels northwards, crossing the Royal Canal and the Maynooth railway line adjacent to Broome Bridge. It then runs adjacent to the east of Broombridge Road and the Dublin Industrial Estate. It then crosses the Tolka Valley Park before reaching the proposed St Helena's Stop and then proceeds northwards towards the proposed Luas Finglas Village Stop. From here, the route passes through a new corridor created within the Finglas Garda Station car park, making its eastern turn onto Mellows Road. The route then proceeds through Mellows Park, crossing Finglas Road, towards the proposed St Margaret's Road Stop. Thereafter, the proposed line continues along St Margaret's Road before reaching the terminus Stop proposed at Charlestown.

The proposed Scheme has been designed to interchange with existing and future elements of the transport network including interchange opportunities with bus networks at all the new Stops and with mainline rail services at Broombridge, and a Park & Ride facility to intercept traffic on the N/M2. In addition, the proposed Scheme through the inclusion of integrated cycle lanes and cycling infrastructure sets out to facilitate multimodal "cycle-LRT trips" as a key aspect of the Luas Finglas scheme.

The proposed Scheme will comprise a number of principal elements as outlined in Table 22-1 and Table 22-2. A full description of the proposed Scheme is provided in the following chapters of this EIAR:

- Chapter 1 (Introduction);
- Chapter 5 (Description of the proposed Scheme); and
- Chapter 6 (Construction Activities).

Table 22-1: Overview of the Key Features of the proposed Scheme

Scheme Key Features	Outline Description
Permanent Scheme Elements	
Light Rail Track	3.9km extension to the Luas Green Line track from Broombridge to Finglas (2.8km of grass track, 700m of embedded track and 360m of structure track)
Depot Stabling Facility	A new stabling facility (with stabling for eight additional LRVs) will be located just south of the existing Broombridge terminus, as an extension of the Hamilton depot area.
Luas Stops	Four Stops located at: St Helena's, Finglas Village, St Margaret's Road, and Charlestown to maximise access from the catchment area including the recently re-zoned Jamestown Industrial Estate.
Main Structures	Two new Light Rail Transit (LRT) bridges will be constructed as part of the proposed Scheme, a bridge over the River Tolka within the Tolka Valley Park and a bridge over the Royal Canal and the Iarnród Éireann (IÉ) railway line at Broombridge. A number of existing non-residential buildings shall be demolished to facilitate the proposed Scheme. In addition, the existing overbridge at Mellows Park will be demolished.
At Grade Signalised Junctions	10 at grade signalised junctions will be created at: Lagan Road, Ballyboggan Road, Tolka Valley Road, St. Helena's Road, Wellmount Road, Cappagh Road, Mellows Road, North Road (N2), McKee Avenue, Jamestown Business Park entrance. Note: The junction at Charlestown will be reconfigured but does not have an LRT crossing.

Scheme Key Features	Outline Description
Uncontrolled Crossings	13 at grade uncontrolled crossings (11 pedestrian / cycle crossings and two local accesses located at: Tolka Valley Park, St Helena's, Farnham pitches, Patrickswell Place, Cardiff Castle Road, Mellows Park, St Margarets Road, and ESB Networks.
Cycle Facilities	Cycle lanes are a core part of the proposed Scheme in order to facilitate multimodal "cycle-LRT trips". Approximately 3km of segregated cycle lanes and 100m of non-segregated cycle lanes along the route. Covered cycle storage facilities will be provided at Broombridge Terminus, Finglas Village Stop and St Margaret's Stop and within the Park & Ride facility. "Sheffield" type cycle stands will be provided at all stop locations.
Power Substations	Two new traction power substations for the proposed Scheme will be located near Finglas Village Stop behind the existing Fire Station, and near the N2 junction before St Margaret's Road Stop where the current spiral access ramp to the pedestrian overbridge is located. A third substation is required for the Park & Ride facility.
Park & Ride Facility	A new Park & Ride facility, with e-charging substation, located just off the M50 at St Margaret's Stop will be provided with provision for 350 parking spaces and secure cycle storage. The building will feature photovoltaic (PV) panel roofing and is the location for an additional radio antenna. This strategic Park & Ride connecting the N2/M50 to the city centre will increase the catchment area of the proposed Scheme.
Temporary Scheme Elements	
Construction Compounds	There will be three principal construction compounds, two located west of Broombridge Road and one located at the northern extents of Mellows Park. In addition, there are other secondary site compound locations for small works/storage. Details can be found in Chapter 6 (Construction Activities) of this EIAR.

Table 22-2: Summary of New Bridges of the proposed Scheme

Identity	Location	Description
Royal Canal and Rail Bridge	Approximately 10m east of the existing Broome Bridge and then continuing north, parallel with Broombridge Road on its east side	The proposed bridge is an eight-span structure consisting of two main parts: a variable depth weathering steel composite box girder followed by a constant depth solid concrete slab. The bridge has the following span arrangement: 35 + 47.5 + 30 + 17 + 3x22 + 17m. Steel superstructure extends over the first three spans. The bridge deck is continuous over the full length of 212.5m and has solid approach ramps at both ends.
Tolka Valley Park Bridge	Approximately 30m west of the existing Finglaswood Bridge	A three-span structure with buried end spans, thus appearing as a single span bridge. End spans as well as part of the main span consist of post-tensioned concrete variable depth girder, the central section of the main span is a suspended weathering steel composite box girder. The overall length of the bridge is 65m with spans 10m, 45m, 10m.

22.2 Risk of Major Accidents and / or Disasters

The European Union Directive 85/337/EC required that certain private and public projects which are likely to have significant resultant environmental impacts are subject to a formalised Environmental Impact Assessment (EIA) prior to their consent. This Directive was subsequently amended by the EU through three amendments: 97/11/EC, 2003/4/EC, and 2009/31/EC, which were then codified in Directive 2011/92/EU. Subsequently, on 16 April 2014, Directive 2011/92/EU was amended by Directive 2014/52/EU of the European Parliament and of the Council, (the Directive 2011/92/EU, as amended by Directive 2014/52/EU, will be hereafter referred to as the "EIA Directive").

Article 3 (1) of the EIA Directive requires that the EIAR ‘shall identify, describe and assess in the appropriate manner, in light of each individual case, the direct and indirect significant effects of a project on population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage and landscape.’

Article 3(2) of the Directive states that ‘the effects referred to in paragraph 1 on the factors set out there in 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.’

The information relevant to major accidents and/or disasters to be included in the EIAR is set out in paragraph 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.’

The Guidelines on the information to be contained in Environmental Impact Assessment Reports (hereafter referred to as the “EPA Guidelines”) (EPA, 2022) elaborate further on risk assessment under Section 3.7.3:

‘To address unforeseen or unplanned effects the Directive further requires that the EIAR takes account of the vulnerability of the project to risk of major accidents and / or disasters relevant to the project concerned and that the EIAR therefore explicitly addresses this issue. The extent to which the effects of major accidents and / or disasters are examined in the EIAR should be guided by an assessment of the likelihood of their occurrence (risk).’

Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EU (hereafter referred to as the Seveso III Directive) is also relevant to this assessment.

The Seveso III Directive and the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (S.I. No. 209/2015) (hereafter referred to as the COMAH Regulations) outline the legal obligations for operators of industrial establishments where dangerous substances are stored. These establishments are referred to as Seveso sites and are classified as Upper Tier or Lower Tier establishments. As per Regulation 25 of the COMAH Regulations, Upper Tier establishments are required to submit information regarding their operations to the Health and Safety Authority (HSA). Each Seveso site has a consultation zone which is the ‘area liable to be affected by a major accident’ at the site (Department of the Environment, Community and Local Government (DECLG, 2015)). Therefore, if a development falls within the specified consultation zone of a Seveso site, the HSA must be consulted. The proposed Scheme does not fall within the consultation zone for any Seveso sites (please refer to Volume 5 - Appendix A22.2 of this EIAR for further details).

This Chapter of the EIAR identifies how risks of accidents and / or disasters relevant to the proposed Scheme have been identified and how those risks have been managed. This chapter considers:

- Major accidents and / or disasters that the proposed Scheme may be vulnerable to;
- Whether a major accident and / or disaster occurring could result in likely significant environmental impacts, and if so, what these would be; and
- Existing and proposed mitigation measures to prevent or mitigate the likely significant adverse impacts of such events on the environment.

22.2.1 Definitions

For the purpose of this assessment, the following definitions from IEMA Primer have been adopted:

- Disaster – May be a natural hazard (e.g., earthquake) or a human-caused/external hazard (e.g., act of terrorism) with the potential to cause an event or situation that meets the definition of a major accident;
- Major Accident – Events that threaten immediate or delayed serious environmental effects to human health, welfare and/or the environment and require the use of resources beyond those of the client or its appointed representatives to manage. Whilst malicious intent is not accidental, the outcome (e.g., train derailment) may be the same and therefore many mitigation measures will apply to both deliberate and accidental events;
- Risk – The likelihood of an impact occurring, combined with the effect or consequence(s) of the impact on a receptor if it does occur;
- Risk event – An identified, unplanned event, which is considered relevant to the development and has the potential to result in a major accident and/or disaster, subject to assessment of its potential to result in a significant adverse effect on an environmental receptor;
- Vulnerability – Describes the potential for harm as a result of an event, for example due to sensitivity or value of receptors. In the context of the EIA Directive, the term refers to the ‘exposure and resilience’ of the development to the risk of a major accident and/or disaster. Vulnerability is influenced by sensitivity, adaptive capacity, and magnitude of impact; and
- Significant environmental effect (in relation to a major accident and / or disaster assessment) – 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.

In addition, a ‘Significant’ impact resulting from major accidents and / or disasters is identified if it meets the criteria for ‘Significant’, ‘Very Significant’ or ‘Profound’ under the EPA Guidelines (EPA, 2022).

22.3 Methodology

22.3.1 Scope and Context

The identification, control and management of risk is an integral part of the design and assessment process throughout all stages of a project lifecycle. The scope and methodology of this assessment is centred on the understanding that the proposed Scheme will be designed, built, and operated in line with best international current practices and guidelines. As a result, major accidents resulting from the proposed Scheme will be very unlikely.

The elements of the proposed Scheme that incorporate measures that are designed to eliminate, reduce, isolate, control or exploit the occurrence of accidents, have been described throughout this EIAR where required. Measures to mitigate risks associated with Construction Phase activities are incorporated in the Construction Environmental Management Plan (CEMP) in Volume 5 - Appendix A6.1 of this EIAR. Measures to control risks associated with Operational Phase activities will be incorporated into the Operational Strategy by the principal contractor in accordance with the requirements outlined in this EIAR and any Railway Order (RO) granted by An Bord Pleanála (hereafter referred to as “the Board”).

The methodology for this risk assessment is as follows:

- Identify major accidents and / or disasters (i.e., unplanned incidents) that the proposed Scheme may be vulnerable to; and
- Assess the consequent impacts and significance of such incidents in relation to the environmental, social, and economic receptors that may be affected.

Such risks may be present at the Construction Phase and / or Operational Phase of the proposed Scheme.

22.3.2 Legislation, Guidelines and Reference Material

The development of the risk assessment methodology has been informed by the following guidelines:

- Advice Notes for Preparing Environmental Impact Statements Draft (EPA, 2015);
- S.I. No. 291 of 2013 - Safety, Health, and Welfare at Work (Construction) Regulations 2013 (hereafter referred to as the Safety, Health, and Welfare (Construction) Regulations);
- Safety, Health, and Welfare at Work Act 2005 (as amended) (hereafter referred to as the Safety, Health, and Welfare at Work Act);
- S.I. No. 138 of 2012 - Building Regulations (Part A Amendment) Regulations 2012 (as amended);
- S.I. No. 299 of 2007 - Safety, Health, and Welfare at Work (General Application) Regulations 2007 (as amended);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports; May 2022 (EPA, 2022);
- Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report (EC, 2017);
- IEMA Primer (IEMA, 2020);
- A National Risk Assessment for Ireland 2023 - Overview of Strategic Risks;
- Strategic Emergency Management National Structures and Framework (Department of Defence, 2020);
- Guidance on Assessing and Costing Environmental Liabilities (EPA, 2014);
- A Framework for Major Emergency Management (DHLGH, 2021);
- A Framework for Major Emergency Management. Guidance Document 10 (DECLG, 2015);
- A Guide to Risk Assessment in Major Emergency Management (DEHLG, 2010);
- Dublin City Council (DCC) Major Emergency Plan (DCC, 2015);
- Fingal County Council (FCC) Major Emergency Plan (FCC, 2023);
- CRR-G-032-B, CRR Guideline for the Application for Acceptance for New Light Rail Works or New Light Rail Rolling Stock (CRR, 2020);
- CRR-G-033-C, Guideline for Application for Acceptance of New Light Rail Works (CRR, 2020);
- CRR-G-016-C, Guideline for Application for Acceptance of Light Rail Rolling Stock (CRR, 2020);
- Maximum Aircraft Movement Data and the Calculation of Risk and PSZs: Dublin Airport (DT & DoEHLG, 2005); and
- Recital 15 of Directive 2014/52/EU (amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment).

Transport Infrastructure Ireland's (TII's) strategies and procedures:

- Business Continuity Management – Process, Plans and Teams;
- Business Continuity Plans; and
- Incident Management Plans.

The following scheme specific documents have also informed the assessment:

- The CEMP, including topics addressed as follows; and
 - Construction and Demolition Resource and Waste Management;
 - Construction Traffic Management;
 - Non-Native Invasive Species Management;
 - Surface Water Management; and
 - Environmental Incident Response.
- Flood Risk Assessment.

22.3.3 Risk Assessment Methodology

A site-specific risk assessment identifies and quantifies risks focusing on unplanned, but possible and plausible events occurring during the construction and operation of the proposed Scheme. The approach to identifying and quantifying risks associated with the proposed Scheme by means of a site-specific risk assessment is derived from the EPA guidance.

The rating criteria adopted for the assessment follows that used in A Guide to Risk Assessment in Major Emergency Management.

The risk assessment is set out in three stages:

- Identification and Screening;
- Risk Classification; and
- Risk Evaluation.

22.3.3.1 Identification and Screening

The first stage of the assessment is to identify potential unplanned risks that the proposed Scheme may be vulnerable to. An initial list of relevant hazards which may make the proposed Scheme vulnerable to major accidents and / or disasters were sourced through consultation within the Luas Team, with its environmental specialists and design engineers and by consulting the guidelines and reference documentation. These hazards were then grouped into 'risk events'.

The list of potential risk events that could lead to major accidents and / or disasters (refer to Volume 5 - Appendix A22.1 Hazard Identification Record of this EIAR) was subjected to an initial screening assessment to identify those that meet the scoping criteria. Where appropriate, risk events were screened out of the assessment according to the following scoping criteria:

- Major accidents and / or disasters associated with Construction Phase and Operational Phase activities that fall within the scope of health and safety legislation and associated obligations;
- Major accidents and / or disasters as a result of Seveso Sites, for which the proposed Scheme does not fall within the specified consultation distance for that Seveso site and for which the proposed Scheme has no interaction with access to the designated hospital(s) and fire stations identified on a Seveso site's emergency plans;
- Risk events where no 'source-pathway-receptor' linkage exists to result in a major accident and / or disaster (e.g., an oil spill occurring at an oil depot that is not located near a watercourse and for which there is no pathway from source to receptor);
- Major accidents and / or disasters where risk events are not applicable to that particular geographic location (e.g., volcanic activity, earthquakes, and risk of nuclear accidents in Ireland);
- Risk events in relation to users of the proposed Scheme infrastructure (Luas users, cyclists, pedestrians) during the Operational Phase, as the scope of this assessment for the Operational Phase relates to the provision of infrastructure only and not to the use of that infrastructure;
- Risk events that possess low likelihood / low consequence, as they do not meet the criteria to be brought forward for further consideration (i.e., they do not meet the definition of a major accident and / or disaster), for example, the risk of traffic accidents on the wider road network causing delays to Construction or Operational Phase vehicles;
- Risk events that possess high likelihood / high consequence, as these would be considered high risk and unacceptable for the development of the proposed Scheme; and
- Risk events in relation to existing emergency access arrangements and response plans for facilities along the route of the proposed Scheme.

22.3.3.2 Risk Classification

Following the initial identification and screening process, the remaining major accidents and / or disasters risk events were evaluated with regard to the likelihood of occurrence and the potential impact. The rating criteria adopted for the assessment follows that used in A Guide to Risk Assessment in Major Emergency Management combined with guidance from IEMA Primer and guidelines provided in the EPA Guidelines.

The EPA Guidelines state that the risk assessment must be based on a 'worst-case' approach. Therefore, the consequent rating assumes that all embedded design mitigation measures and safety procedures have failed to prevent the MANDs.

The classification and rating of likelihood and consequence are provided in Table 22-3 and Table 22-4, and these apply to both the Construction Phase and Operational Phase.

Table 22-3: Risk Classification Table – Likelihood (DEHLG, 2010)

Rating	Classification	Impact Description
1	Extremely Unlikely	May occur only in exceptional circumstances; once every 500 or more years.
2	Very Unlikely	Is not expected to occur; no recorded incidents or anecdotal evidence; and / or very few incidents in associated organisations, facilities or communicates; and / or little opportunity, reason or means to occur. May occur once every 100 to 500 years.
3	Unlikely	May occur at some time; and / or few, infrequent, random recorded incidents or little anecdotal evidence; some incidents in associated or comparable organisations worldwide; some opportunity, reason or means to occur. May occur once every 10 to 100 years.
4	Likely	Likely to or may occur; regular recorded incidents and strong anecdotal evidence. Will probably occur once every one year to 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.

Table 22-4: Risk Classification Table – Classification of Consequence (DEHLG, 2010)

Rating	Consequence	Impact	Description
1	Minor	<ol style="list-style-type: none"> Life, Health, Welfare; Environment; Infrastructure; and Social 	<ol style="list-style-type: none"> Small number of people affected; no fatalities and small number of minor injuries with first aid treatment; No contamination, localised effects; <€0.5M; and/or Minor localised disruption to community services or infrastructure (<6 hours).
2	Limited	<ol style="list-style-type: none"> Life, Health, Welfare; Environment; Infrastructure; and Social. 	<ol style="list-style-type: none"> Single fatality; limited number of people affected; a few serious injuries with hospitalisation and medical treatment required and Localised displacement of a small number of people for 6 to 24 hours. Personal support satisfied through local arrangements; Simple contamination, localised effects of short duration; 0.5 million to 3 million euro; and/or Normal community functioning with some inconvenience.
3	Serious	<ol style="list-style-type: none"> Life, Health, Welfare; Environment; Infrastructure; and Social. 	<ol style="list-style-type: none"> 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 to 24 hours or possibly beyond; up to 500 evacuated. External resources required for personal support; Simple contamination, widespread effects, or extended duration; 3 million to 10 million euro; and/or Community only partially functioning, some services available.
4	Very Serious	<ol style="list-style-type: none"> Life, Health, Welfare; Environment; Infrastructure; and Social. 	<ol style="list-style-type: none"> 5 to 50 fatalities, up to 100 serious injuries, up to 2,000 evacuated; Heavy contamination, localised effects, or extended duration; 10 million to 25 million euro; and/or Community functioning poorly, minimal services available.
5	Catastrophic	<ol style="list-style-type: none"> Life, Health, Welfare; Environment; Infrastructure; and Social. 	<ol style="list-style-type: none"> Large numbers of people impacted with a significant number of fatalities (>50), injuries in the hundreds, more than 2000 evacuated; Very heavy contamination, widespread effects of extended duration; >25 million euro; and/or Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support.

22.3.3.3 Risk Evaluation

- In accordance with A Guide to Risk Assessment in Major Emergency Management (DEHLG, 2010), the evaluated major accidents and / or disasters risk events were compared to a risk matrix to determine the level of significance of each risk event. These have been grouped according to three categories, as per Table 22-5;
- High Risk** – events that have an evaluation score of 15 to 25, as indicated by the Red zone;
- Medium Risk** – events that have an evaluation score of 8 to 12, as indicated by the Amber zone; and
- Low Risk** – events that have an evaluation score of 1 to 6, as indicated by the Green zone.

Table 22-5: Level of Significance

	Consequence of Impact					
		1 – Minor	2 – Limited	3 – Serious	4 – V. Serious	5 - Catastrophic
Likelihood	5 – V. Likely	5	10	15	20	25
	4 – Likely	4	8	12	16	20
	3 – Unlikely	3	6	9	12	16
	2 – V. Unlikely	2	4	6	8	10
	1 – Ext. Unlikely	1	2	3	4	5

Significant impact resulting from major accidents and / or disasters are adverse impacts that are described as ‘Significant,’ ‘Very Significant’ or ‘Profound’ under the EPA Guidelines. Consequently, major accidents and / or disasters risk events that fall within the Amber or Red Zones (‘Medium’ or ‘High’ risk events) are considered to present risk of significant impacts and are brought forward for further consideration and assessment for mitigation.

22.3.4 Description of Study Area

For the purpose of this chapter, the study area includes the extent of the proposed Scheme, as well as any haul routes to and from the proposed Scheme during the Construction and Operational Phases.

Consideration has also been given to sites that have potential for major accident hazard under the Chemical Act (Control of Major Accident Hazard involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015).

22.3.5 Survey Methodology

Information was gathered from desktop studies and surveys completed for specialists in order to verify environmental factors contained within other chapters of this EIAR and to inform this assessment as appropriate.

22.3.6 Consultation

Consultation, and the consideration of feedback from the public and statutory consultees is a key part of the EIA process and integral to informing the design development and this environmental assessment.

The key consultation phases and the feedback received that has informed this chapter include:

- Options Selection process, and
 - Non-statutory public consultation on the Emerging Preferred Route (EPR) (28th July 2020 – 17th September 2020). The purpose of this first non-statutory consultation was to present the EPR and the concept design for the proposed Scheme and to elicit the views of the public and stakeholders.
 - Non-statutory public consultation on Preferred Route (PR) Option (7th December 2021 – 31st January 2022). The purpose of this consultation period was to present the PR and the key changes that were implemented following the consideration of feedback received during the consultation for the EPR, and to receive further feedback from the public on the design development.
- Non-statutory EIA Scoping Report.

Chapter 1 (Introduction) of this EIAR includes details relating to the non-statutory consultation undertaken during the development of the proposed Scheme. The feedback received is summarised in the public consultation reports in Volume 5 - Appendix A1.1, Appendix A1.2 and Appendix A1.3. The findings of these reports have informed this Chapter as appropriate. Close collaboration with the Luas Team and other EIA specialists has also helped inform the assessment.

22.4 Baseline

22.4.1 Sensitive Receptors

As described throughout the technical environmental chapters of this EIAR (Chapters 7 to 21), there are a number of sensitive receptors located along or near the alignment of the proposed Scheme that may be vulnerable to major risks and/or natural disasters. These include the following:

- The population located along the alignment, as discussed, and assessed under Chapter 7 (Human Health) and Chapter 8 (Population). These not only include residential properties but also include educational facilities, places of worship, recreational areas, sports grounds, hospitals, and other buildings with sensitive activities. Community facilities, businesses, and green spaces - including three parks: Tolka Valley Park, Farnham Crescent and Mellowes Park - are considered as sensitive receptors as well as school and colleges located along the proposed Scheme;
- There are some cultural heritage sites within the proposed Scheme alignment. Fourteen of them are of High importance, fifteen of Medium importance, nine of Low importance, twelve of Very Low, and sixteen of Neutral importance. Associated constraints within the study area include bridges, railway structures, religious houses, holy wells, a water tower, townland boundaries, quarry, etc. These constraints have been detailed and assessed in Chapter 20 (Cultural Heritage) of this EIAR;
- The study area lies within the Liffey and Dublin Bay Catchment which contains the largest population of any catchment in Ireland. The proposed Scheme crosses the River Tolka, the Royal Canal and the Finglaswood stream, details in Chapter 10 (Water). These are waterbodies classified as at Risk due to the poor-quality status they have. Tolka Valley Park is an area considered to be in risk of flooding;
- Sensitive habitats and protected designated European sites are detailed and assessed in Chapter 9 (Biodiversity) and the Natura Impact Statement of this EIAR. Using a source-pathway-receptor model, within a 15km buffer zone of the proposed Scheme, six European Natura 2000 sites and five proposed Natural Heritage Areas have been identified and which are present within the Zol. Arising from ecological survey, some types of habitats are recorded, such as stonewall habitats, aquatic habitat, wetland habitat, neutral grassland habitat, scattered trees and parkland habitats;
- Four air quality zones have been defined in Ireland for air quality management and assessment purposes and Dublin is defined as Zone A, and which is likely to have higher air pollutant concentrations. The proposed Scheme lies within Zone A. Details of the risk of dust impacts on sensitive receptors and air quality are given in Chapter 13 (Air Quality);
- Existing pedestrian infrastructure, cycle infrastructure and bus infrastructure can pose a risk to or from the proposed Scheme. Furthermore, climate change may change the likelihood of a natural disaster occurring. Climate effects on the proposed Scheme have been assessed in further detail in Chapter 14 (Climate), and details for traffic and transport infrastructure are given in Chapter 18 (Material Assets: Traffic & Transport);
- GSI Quaternary Sediments mapping indicates that limestone-derived till overlies the bedrock geology across much of the proposed Scheme. Studies have indicated that the potential for landslide in the study area are evaluated to be low. Contamination of groundwater may be present during earthworks and dewatering activities. Land, soil, geology and hydrogeology have been detailed and assessed in Chapter 11 (Land & Soils); and
- The route of the proposed Scheme runs through some open green spaces like Tolka Valley Park and River Tolka, and a part of it passes large number of nearby houses, industrial and commercial sites, with fewer green areas. The presence of elements of landscape sensitivity i.e., designated landscapes (including scenic, cultural heritage and ecological), valued open space areas, vegetation, and watercourses are defined in Local Landscape Character Areas. The Landscape and visual sensitive receptors have been assessed and detailed in Chapter 21 (Landscape and Visual Amenity).

22.4.2 Seveso Sites

A review was undertaken of Upper Tier and Lower Tier Seveso sites and their respective distances from the proposed Scheme. This is presented in Volume 5 - Appendix A22.2 in Volume 5 of this EIAR. The proposed Scheme does not fall within the consultation zone for any Seveso site.

A review of the traffic impact assessment reported in Chapter 18 (Material Assets: Traffic & Transport) of this EIAR has also been undertaken to determine the potential for impacts on emergency response accesses to Seveso sites from their respective nearest hospital and fire stations. No significant impacts on emergency response times are anticipated.

22.5 Potential Impacts

22.5.1 'Do Nothing' Scenario

With respect to risk of major accidents and / or disasters, the 'Do Nothing' scenario means that there are no changes to existing infrastructure or utilities as a result of the proposed Scheme. Therefore, there would be a Neutral impact on risk of major accidents and / or disasters under the 'Do Nothing' scenario.

22.5.2 Risk Evaluation

As indicated in Section 22.3, the potential impacts in this section assume a worst-case scenario, which does not consider the implementation of mitigation measures or emergency plans which would be put in place to reduce the likelihood and potential impact of any major accidents and / or disasters.

A MANDs Risk Register has been developed which contains the reasonable worst-case scenarios identified as presenting a probabilistic risk during the Construction Phase and Operational Phase of the proposed Scheme, and the risks have been evaluated using the criteria in Section 22.4. This evaluation is provided in Table 22-6 (Construction Phase) and Table 22-7 (Operational Phase).

The key objective of this risk register is to identify whether additional mitigation and/or management measures are required (above those mitigation measures that have already been embedded in the current design) to manage the identified risks to the environment to be "as low as reasonably practicable" (ALARP). It is important to reiterate that this assessment will typically focus on '*low likelihood but potentially high consequence events*' (IEMA 2020).

Table 22-6: Rating of Construction Phase MANDs in the Absence of Mitigation

ID	Risk Event	Source and/or pathways	Reasonable Worst consequence if event did occur	Proposed Scheme Element	Likelihood Rating	Consequence Rating	Resulting Risk Category	Could this lead to a Major Accident or Disaster?
C1	Heavy rain and prolonged flooding leading to settlement release	<p>Extreme weather (rain/flood) Heavy rain and prolonged flooding leading to flooding from the River Tolka or other adjacent watercourses within the Tolka_050 RBMP.</p> <p>It is noted that the Bachelors Stream and the Finglaswood Stream are culverted in the vicinity of the site, blockage of culverts or siphons within the urban drainage network could result in localised flooding.</p> <p>Extreme weather event resulting in sediment load runoff during construction exceeding attenuation pond settlement capacity near watercourse.</p> <p>Prolonged periods of heavy rainfall at surface works including open and deep excavations.</p>	<p>Extreme weather events may lead to flooding and result in flooded construction sites and property damage and contaminated runoff into watercourses.</p> <p>Impacts on the aquatic environment and protected European sites downstream.</p> <p>Runoff from attenuation pond resulting in uncontrolled releases of untreated water into the watercourse.</p>	Throughout	1 – Ext. Unlikely	3 – Serious	3 – Low	<p>No – this is not considered a MAND. During construction, the risk of accidental release to surface water will be reduced by the development and implementation of a Surface Water Management Plan (SWMP), Flood Response Plan and Environmental Incident Response Plans as part of the CEMP.</p> <p>The flood risk to structures on a construction site can be mitigated through the design of the structure and programming of construction activities. This can be done through alterations to the permanent design, changing the construction sequence or programming activities to weather events, temporary mitigations such as sheet piling and cofferdams, sandbags, mobile barriers and plant, equipment and material mitigation. During construction, the Contractor is required to assess the risk of flood inundation and submit all proposals for protection of the works against flooding to the Project Manager for acceptance. During construction, specific flooding risks will be maintained within the risk database to ensure up-to-date mitigations are recorded and acted upon – via the construction stage risk register. These will be managed in each area in accordance with the area Risk Management Plan. The Contractor shall prepare a plan for construction works detailing his sequences and methods of construction and include proposals to manage the risk of flooding of the works. Refer to Chapter 10 (Water) and the CEMP for further detail</p>
C2	Fire and/or explosion, or release of harmful gas	<p>Risk of wildfire due to surrounding landscape/grassland.</p> <p>Presence of former landfill sites (Tolka Valley Park) along alignment.</p> <p>Presence of unexploded ordnance.</p> <p>Presence of ground gas along alignment.</p> <p>Presence of gas transmission pipelines along the alignment.</p> <p>Fuel storage at construction compounds.</p> <p>Construction works requiring hot work.</p> <p>Accidental ignition of combustible materials.</p> <p>Electrical faults.</p> <p>Vandalism.</p> <p>Theft of explosive materials.</p> <p>Emission of dielectric gas, sulphur hexafluoride (SF6) from Substations.</p>	<p>Contamination of water resources resulting from runoff of fire water.</p> <p>Drift from fire into public property with resulting damage to property and/or loss of crops.</p> <p>Risk of fire from extreme drought during surface construction works, taking into account climate change.</p> <p>High winds and dry conditions may spread fire into proposed Scheme construction sites. Misuse of explosive materials resulting in injury, fatalities, and environmental impacts. SF6 is also a highly potent greenhouse gas which the IPCC Fifth Assessment Report (AR5) stated has a GWP of 23,500 (IPCC, 2015).</p>	Throughout	2 – V. Unlikely	3 – Serious	6 - Low	<p>No – this is not considered a MAND.</p> <p>It is currently assumed that there will be no storage of explosives at the construction sites and that material will be transported from an existing licenced facility to the sites as required in accordance with the Carriage of Dangerous Goods by Road Act 1998 (No 43 of 1998) and associated Regulations and the Explosives Act, 1875 (as amended by the Criminal Justice Act 2006).</p> <p>While SF6 has a high global warming potential (GWP) value, the potential emissions of SF6 are considered to be negligible as the gas will require the implementation of strict protocols within the design for construction and maintenance, including leak detection measures, to avoid fugitive emissions.</p> <p>In addition, all other construction works in the vicinity of combustible material will be managed in line with the CEMP and any incidents will be managed, based on emergency response procedures to be developed as part of the CEMP.</p> <p>Other measures to control these risks include the following:</p> <ul style="list-style-type: none"> Fire loading to be minimised by good housekeeping, and the Fire Safety Strategy to be maintained and revised as construction proceeds. Hot work permit procedure will be developed for all hot works. Areas will be kept clear of combustible materials, with dedicated areas for waste processing. Power distribution systems to be purpose designed. <ul style="list-style-type: none"> 24-hour security will be on all sites.

ID	Risk Event	Source and/or pathways	Reasonable Worst consequence if event did occur	Proposed Scheme Element	Likelihood Rating	Consequence Rating	Resulting Risk Category	Could this lead to a Major Accident or Disaster?
C3	Impact on critical infrastructure due to construction works including settlement	Construction works and settlement directly impacting on underground and aboveground services.	<p>Water Services – Risk of damaging strategic critical infrastructure such as water/foul pipes, resulting in flooding of adjacent properties, flooding of excavation and risk of damage to equipment. Risk of soil and groundwater contamination from sewer and associated environmental impacts.</p> <p>Energy supply – Risk of damaging underground and overhead cables resulting in power outage, risk of electrification and explosion. Risk of damaging gas mains resulting in supply outage and risk of explosion resulting in fatality and/or injury to workers and public.</p> <p>Fibre Telecommunications - Risk of damaging underground cables resulting in outages on phone and data networks leading to businesses and residents not being able to operate.</p>	Throughout	3 – Unlikely	3 – Serious	9 – Medium	Yes – further mitigation and management plans are required to ensure risk is ALARP (as low as reasonably practicable), refer to Table 22-8.
C4	Major road traffic accident	<p>Increase in traffic and Heavy Goods Vehicles (HGVs) using construction haul routes and site access points. Structures/debris/temporary props/ construction/ equipment/vehicles falling onto busy roadway (M50).</p> <p>Unsecure large objects/material falling from HGVs. Collapse of bridges adjacent to work sites from vibrations and ground works.</p>	<p>Major road traffic accident resulting from construction works affecting vehicular, pedestrian and cycle traffic resulting in damage to property and injury and/or fatality.</p> <p>Multiple-vehicle collision on the M50 Motorway due to unexpected falling objects from the M50 Viaduct during construction or from HGVs during transport of materials/equipment. Collapse of bridges such as Cross Guns Bridge during adjacent deep excavation works or tunnelling leading to major traffic accident and potential injury and/or fatality.</p>	Throughout	3 – Unlikely	3 – Serious	9 – Medium	Yes – further mitigation and management plans are required to ensure risk is ALARP, refer to Table 22-8.
C5	Significant release event or long-term seepage of pollutants into watercourse	Working over or adjacent to watercourses (Royal Canal Main Line and Tolka_050).	<p>Pollution event leading to environmental damage, particularly associated with the potential release of silt to the aquatic environment (e.g., truck carrying items has an accident or temporary bridge collapses and releases silt into watercourses).</p> <p>Pollution of groundwater resulting from ground investigations and/or construction work underground. Potential for pollution event on European sites downstream of Royal Canal and River Tolka.</p>	Royal Canal and River Tolka Crossing	2 – V. Unlikely	4 – Very Serious	8 – Medium	Yes – further mitigation and management plans are required to ensure risk is ALARP, refer to Table 22-8.

ID	Risk Event	Source and/or pathways	Reasonable Worst consequence if event did occur	Proposed Scheme Element	Likelihood Rating	Consequence Rating	Resulting Risk Category	Could this lead to a Major Accident or Disaster?
C6	Industrial incident - incident at nearby Seveso site involving release of dangerous substances	Fire/explosion and equipment/infrastructure failure at nearby Seveso site impacting the proposed Scheme. The nearest licensed Seveso site to the proposed Scheme is Huntstown Power Station.	Risk of occurrence of a major emission, fire or explosion resulting in off-site environmental impact.	Northern section of Finglas Luas (Charlestown Luas Stop)	2 - Very Unlikely	2 – Limited	4 - Low	No – embedded design measures ensure the risk is ALARP and will not constitute a MAND. Facilities 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)). TII will liaise and coordinate risks associated with the Health and Safety Authority of Ireland with regard the Seveso sites. The Contractor will develop the CEMP and interface with the Health and Safety Authority of Ireland to identify and mitigate the risks to either party. A specific Seveso Interface Management Plan will be developed by the Contractor. Regular interface meetings will be convened to assure that risks remain current and mitigations valid.
C7	Collapse / Damage to structures	Risk of collapse of structures during construction over Royal Canal and Rail Bridge and River Tolka Crossing (Ballyboggan Road / Tolka Valley Road).	Risk of proposed structures collapsing, resulting in injury or death to workers and the general public; Collapse/Damage to protected structures; and Damage to adjacent occupied buildings resulting in injury or death to the general public.	Works over Royal Canal and Rail Bridge and River Tolka Crossing (Ballyboggan Road / Tolka Valley Road).	2 - Very Unlikely	4 – V. Serious	8 - Medium	Yes – further mitigation and management plans are required to ensure risk is ALARP, refer to Table 22-8.
C8	Biosecurity	Presence of invasive species at construction sites and compounds, including, but not limited to, Japanese Knotweed and Giant Hogweed which are reported to be scattered along 1.7km of the banks of the River Tolka.	Risk of spread of invasive species during construction works, particularly during site clearance works.	Throughout	3 - Unlikely	2 – Limited	6 - Medium	No – this is not considered a MAND. An Invasive Species Management Plan (ISMP) containing site-specific recommendations for Invasive Species will be implemented for the Proposed Scheme as part of the CEMP.

Note - The ID tags “C” and “O” represents the Construction and Operation phase, respectively.

Table 22-7: Rating of Operational Phase MANDs in the Absence of Mitigation

ID	Risk Event	Hazard Source – Pathway	Reasonable Worst-Case Scenario	Proposed Scheme Element	Likelihood Rating	Consequence Rating	Resulting Risk Category	Could this lead to a Major Accident or Disaster?
O1	Luas Finglas Derailment	Power failure; Electromagnetic interfaces; Signalling; Control centre/communications failure; Cyber security threat; Unknown obstruction or trespasser on railway; Terrorist incident; Failure of crossover; Structural collapse (Royal Canal Bridge and Tolka Valley Park Bridge); Rolling stock failure; Electrical infrastructure failure (including due to lightning or high winds); Settlement leads to track problems; and Poor track adhesion.	Major rail derailment accident resulting in death and infrastructural damage and potential for environmental impacts depending on location of derailment; Severe disruption to rail transportation; The risk of errant vehicle entering track resulting in collision between rolling stock and road vehicle; Terrorist attack leading to explosion and derailment. This could result in fatalities, injury and potential for damage to the bridges resulting in subsidence on the surface; Impact on existing roadway carriage causing major traffic accident; Spillage of pollutants; and Emergency response impacts on environmental receptors.	Track	3 – Unlikely	4 – V. Serious	12 - Medium	Yes – further mitigation and management plans are required to ensure risk is ALARP, refer to Table 22-8.
O2	Fire and/or explosion, either direct or indirect harm	Maintenance activities; Risk of wildfire from extreme drought, taking into account climate change, high winds and dry conditions; Risk of wildfire due to surrounding landscape/grassland; Electrical faults on LRV; Unexploded ordnance adjacent to alignment; Explosive gases within drainage system; Terrorist incident; and Fire causes degradation to track/ infrastructure – secondary effect.	Contamination of water resources resulting from runoff of fire water; Drift from fire into public property with resulting damage to property and/or loss of crops; Risk of fire in the Stops or LRVs causing risk to passengers; and risk of passengers being struck by the LRVs; On-board fire detection system fails resulting in injury and/or death to passengers; Risk of fire from extreme drought during operation, taking into account climate change, high winds and dry conditions may spread fire into proposed Scheme.	Thought	2 – V. Unlikely	4 – V. Serious	8 – Medium	Yes – further mitigation and management plans are required to ensure risk is ALARP, refer to Table 22-8.
O3	Infectious disease	Staff and passengers are vulnerable to the risk of virus outbreak.	The proposed Scheme is vulnerable to the risk of virus outbreak resulting in service disruption and widespread contamination leading to illness and fatalities.	Throughout	2 – V. Unlikely	5 – Catastrophic	10 – Medium	Yes – further mitigation and management plans are required to ensure risk is ALARP, refer to Table 22-8.
O4	Hydrological event – heavy and prolonged rainfall entering Stops and adjacent lands and untreated water entering	Extreme rainfall entering Stops; and Overflow of attenuation ponds near watercourses.	Heavy rain and prolonged rainfall entering Stops; Flooding causing emergency evacuation of vehicles resulting in potential injury to passengers;	Throughout	2 – V. Unlikely	4 – V. Serious	8 – Medium	Yes – further mitigation and management plans are required to ensure risk is ALARP, refer to Table 22-8.

ID	Risk Event	Hazard Source – Pathway	Reasonable Worst-Case Scenario	Proposed Scheme Element	Likelihood Rating	Consequence Rating	Resulting Risk Category	Could this lead to a Major Accident or Disaster?
	surrounding watercourses		Flooding adjacent properties/land; and Untreated water entering nearby watercourse.					
O5	Industrial incident – incident at nearby Seveso site involving release of dangerous substances	Fire/explosion and equipment/ infrastructure failure at nearby Seveso site (closest site is 1.7km north of Charlestown Stop)	Risk of occurrence of a major emission, fire or explosion resulting in off-site environmental impact.	Northern section of Finglas Luas Scheme (Charlestown Luas Stop)	2 – V. Unlikely	2 – Limited	4 – Low	No - Facilities are within consultation zone but 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)).
O6	Vandalism or anti-social behaviour on the LRVs or within the Stops.	Staff and passengers are vulnerable to the risk of crowd violence, arson or anti-social behaviour.	The proposed Scheme is vulnerable to the risk of vandalism resulting in service disruption and injury or fatalities to staff and/or passengers.	Throughout	3 – Unlikely	2 – Limited	4 – Low	<p>No – this is not considered a MAND.</p> <p>Luas Finglas has been designed as an open system for passengers, so that people can walk through the station and onto the LRVs without obstruction;</p> <p>Vandalism and anti-social behaviour on the LRVs and within the Stops will be observed through the CCTV and if required staff sent to diffuse the situation;</p> <p>Measures incorporated into the design to mitigate the potential for Hostile Vehicle Attack:</p> <ul style="list-style-type: none"> There are wheel Stops at road crossings to prevent cars from entering trackway; Special details are also applied to the ground level access points onto the ramps to prevent unauthorised ingress of vehicles onto the Royal Canal Bridge; and Bollards have been installed in specific areas where cars are very close to Stop platforms. <p>Safety features have been incorporated into the design of the Stops and the LRVs to minimise the risk of fire and facilitate evacuation for staff and passengers, including passengers with restricted mobility.</p>

Note - The ID tags “C” and “O” represents the Construction and Operation phase, respectively.

The results from the evaluation have been summarised in Table 22-8.

Table 22-8: Evaluation of Levels of Significance in the Absence of Mitigation

	Consequence of Impact					
		1 – Minor	2 – Limited	3 – Serious	4 – V. Serious	5 - Catastrophic
Likelihood	5 – V. Likely					
	4 – Likely					
	3 – Unlikely		C8: Biosecurity. O6: Vandalism or anti-social behaviour on the LRVs or within the Stops.	C3: Impact on critical infrastructure due to construction works including settlement C4: Major road traffic accident	O1: Luas Finglas Derailment	
	2 – V. Unlikely		C6: Industrial incident; O5: Industrial incident;	C2: Fire and/or explosion, or release of harmful gas	C5: Significant release event or long-term seepage of pollutants into watercourse; C7: Collapse / Damage to structures; O2: Fire and/or explosion, either direct or indirect harm; O4: Hydrological event.	O3: Infectious disease.
	1 – Ext. Unlikely			C1: Heavy rain and prolonged flooding leading to settlement release		

Note - The ID tags “C” and “O” represents the Construction and Operation phase, respectively.

From an examination of the plausible risks presented in Table 22-6 and Table 22-7, the following risks are considered to be below the threshold of significance set for the purposes of this assessment (Green Zone or ‘Low’ risk event).

- C1 – Heavy rain and prolonged flooding leading to settlement release;
- C2 – Fire and/or explosion, or release of harmful gas;
- C6 – Industrial incident - incident at nearby Seveso site involving release of dangerous substances;
- C8 – Biosecurity;
- O5 – Industrial incident – incident at nearby Seveso site involving release of dangerous substances; and
- O6 – Vandalism or anti-social behaviour on the LRVs or within the Stops.

For these risk events listed above, a number of mitigation measures are incorporated in the proposed Scheme design. The assessment of the significance of the impacts indicated that no further mitigation measures and management plans are required to be in place to manage the identified risks to the environment to be as low as reasonably practicable (ALARP). As such these risk events are not considered as MANDs during both construction and operational phase.

No risks have been assessed to fall within the Red Zone ('High' risk scenario). Eight Risk IDs fall within the Amber Zone ('Medium' risk event) and are therefore brought forward for further consideration and assessment of mitigation measures. These following 'medium' risk events fall within both the Construction and Operational Phases.

- C3 – Impact on critical infrastructure due to construction works including settlement;
- C4 – Major Road traffic accident;
- C5 – Significant release event or long-term seepage of pollutants into watercourse;
- C7 – Collapse / Damage to structures;
- O1 – Luas Finglas Derailment;
- O2 – Fire and/or explosion, either direct or indirect harm;
- O3 – Infectious disease;
- O4 – Hydrological event – heavy and prolonged rainfall entering Stops and adjacent lands and watercourses.

The scenario with the highest risk score relates to O3 – Infectious disease associated with the proposed Scheme.

22.6 Mitigation and Monitoring Measures

22.6.1 Inherent Design

As indicated previously, the design of the proposed Scheme has evolved through comprehensive design iteration, with particular emphasis on minimising the potential for environmental impacts, where practicable, whilst ensuring the objectives of the proposed Scheme are attained. The design of the proposed Scheme has been developed in compliance with the relevant design standards which include provisions to reduce the likelihood of risk events occurring (e.g., structures have been designed to avoid the risk of collapse, drainage systems have been designed to cater for increased rainfall events etc.).

Regulation 15 of the Safety, Health and Welfare at Work (Construction) Regulations places a duty on designers carrying out work related to the design of a project to take account of the 'General Principles of Prevention' as listed in Schedule 3 of the Safety, Health and Welfare at Work Act. In addition to the duties imposed by Regulation 15 of the Safety, Health and Welfare at Work (Construction) Regulations, designers must comply with Section 17(2) of the Safety, Health and Welfare at Work Act (as amended) which requires persons who design a project for construction work to ensure, so far as is reasonably practicable, that the project is designed and is capable of being constructed to be safe and without risk to health, that it can be maintained safely and without risk to health during use, and that it complies in all respects, as appropriate, with other relevant legislation. This includes S.I. No. 138/2012 – Building Regulations (Part A Amendment) Regulations 2012 (as amended) and, if the works being designed are intended for use as a workplace, the relevant parts of the Safety, Health, and Welfare at Work (General Application) Regulations (as amended). In accordance with these requirements, the Luas Team established a consistent and appropriate means of assessing the risks that may arise from design decisions and in applying the General Principles of Prevention.

22.6.2 Plans and Procedures

By implementing plans focused on environmental protection, the proposed Scheme can bolster its resilience against risk events. Several of the plans introduced as part of the proposed Scheme to minimise or mitigate against environmental impacts during construction are also considered to reduce the potential risks associated with risk events.

The plans considered to assist in reducing the likelihood of risk events occurring are summarised below. Specific mitigation measures are also included in the relevant Chapters of this EIAR.

22.6.2.1 Construction Environmental Management Plan

A CEMP has been prepared and is included in Volume 5 - Appendix A6.1 of this EIAR. The CEMP will be updated by the appointed Contractor prior to the commencement of the Construction Phase.

The CEMP comprises the construction mitigation measures, which are set out in this EIAR, and will be updated with any additional measures which may be required by the conditions attached to the Board's decision. Implementation of the CEMP will ensure disruption and nuisance are kept to a minimum. The CEMP has been prepared in accordance with the following industry best practice guidance:

- TII's Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan (TII 2007), hereafter referred to as the TII Guidelines; and
- Construction Industry Research and Information Association (CIRIA) in the UK, Environmental Good Practice on Site Guide, 5th Edition C811 (CIRIA 2023).

The CEMP is a working document and will be finalised by the Contractor following appointment and prior to commencing works on site. All of the content provided in this CEMP will be implemented in full by the appointed Contractor and its finalisation will not affect the robustness and adequacy of the information presented and relied upon in this EIAR.

The CEMP is a dynamic document, and the appointed Contractor will ensure that it remains up to date for the duration of the construction period. The CEMP may need to be altered during the lifecycle of the construction period to take account of monitoring results, legislative changes, outcomes of third-party consultations etc. Additional appendices may be added to the CEMP to accommodate monitoring results, permits etc. However, the finalisation of the CEMP by the appointed Contractor will not affect the robustness and adequacy of the information presented here and relied upon in this EIAR.

The CEMP is provided in Volume 5 - Appendix A6.1 of this EIAR.

22.6.2.2 Construction and Demolition Resource and Waste Management

A Construction and Demolition Resource and Waste Management (CDRWM) has been prepared as part of EIAR to demonstrate how waste arising during the Construction Phase (including) demolition works of the proposed Scheme will be managed and disposed of in a way that ensures compliance with the provisions of Number 10 of 1996 – Waste Management Act, 1996, as amended. The CDRWMP will be updated by the appointed contractor.

The CDRWMP is provided in Volume 5 - Appendix A6.5 of this EIAR.

22.6.2.3 Construction Traffic Management

A Construction Traffic Management Plan (CTMP) has been prepared as part of the EIAR to demonstrate how the interface between public and construction-related traffic could be managed, where practicable, and to control vehicular movements associated with the construction of the proposed Scheme. CTMP will be further developed by the appointed contractor so that construction traffic will be managed and monitored safely and efficiently throughout the duration of the Construction Phase. The CTMP will be a 'live document'. The appointed contractor may propose modifications to the CEMP, however any such modifications, will not give rise to any impacts which are more significant than those already identified and assessed in the EIAR or NIS. The works will require the implementation of all the applicable mitigation measures identified in the EIAR and any additional measures required pursuant to conditions imposed by the Board in the CTMP.

The primary objectives of the CTMP are to outline the minimum road safety measures to be undertaken at site access/egress locations during the Construction Phase, including approaches to such access/egress locations. The implementation and organisation of traffic management along the specified haul routes is a critical component of the works to be undertaken and will be given the highest priority during the Construction

Phase of the proposed Scheme. This will reduce the potential for any major accidents directly associated with the proposed Scheme.

The CTMP is provided in Volume 5 - Appendix A6.2 of this EIAR.

22.6.2.4 Non-Native Invasive Species Management

A Non-Native Invasive Species Management Plan (ISMP) has been prepared as part of the EIAR to provide the strategy that will be adopted during the construction of the proposed Scheme in order to manage and prevent the spread of non-native invasive plant species. The Non-Native ISMP will be further developed by the appointed contractor using a suitably qualified ecologist, as necessary.

Further details on the assessment of non-native invasive species, and associated mitigation measures are provided in Chapter 9 (Biodiversity) of this EIAR.

The ISMP is provided in Volume 5 - Appendix A6.3 of this EIAR.

22.6.2.5 Surface Water Management

A Surface Water Management Plan (SWMP) has been prepared as part of EIAR detailing control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the proposed Scheme. This plan is addressed in the CEMP under General Site Management section, summarising the procedures and technical practices for implementing effective sediment, erosion and pollution control that will be adopted during the Construction Phase of the proposed Scheme. The SWMP will be developed further by the appointed contractor.

The SWMP is provided in Volume 5 - Appendix A6.4 of this EIAR.

22.6.2.6 Environmental Incident Response

An Environmental Incident Response Plan (EIRP) has been prepared, demonstrating how, in the unlikely event of an incident, response efforts take place promptly, efficiently, and suitably for the particular circumstances. Developed by the appointed contractor, the management of the risk of major accidents and / or disasters occurring will continue throughout the planning, design, and Construction Phase of the proposed Scheme. The EIRP details procedures that could be undertaken in the event of a significant release of sediment into a watercourse, or a significant spillage of chemical, fuel or other hazardous substances (e.g., concrete), non-compliance incident with any permit or license, or other such risks that could lead to a pollution incident, including flood risks.

This assessment has considered the reasonably foreseeable worst-case consequences, and as such, risks are unlikely to be greater than those that have been assessed within this EIAR. Risks identified as being capable of leading to a MAND were subject to further assessment and determination of risk, post-implementation of mitigation measures. The results are presented in Table 22-9.

For those 'high consequence events', procedures need to be developed to manage and/or control their potential consequence and/or control their potential effects. Therefore, additional mitigation measures and response strategies have been identified for high consequence events, to demonstrate that risks would be managed to be ALARP.

Table 22-9 also shows where impacts occur across multiple environmental disciplines. The EIAR chapters mentioned in column 'Are cross-disciplinary impacts likely?' indicate which disciplines are affected and the chapters where further mitigation measures are described to manage the risk to be ALARP.

The EIRP is provided in Volume 5 - Appendix A6.6 of this EIAR.

Table 22-9: MANDs – Construction Phase and Operational Phase Assessment of Mitigation Measures

ID	Risk Event	Pre-Mitigation Risk Score	Are cross-disciplinary impacts likely?	Key Risk Management and Mitigation Measures to Demonstrate Risk to be as low as reasonably practicable (ALARP)	Post Mitigation Likelihood	Consequence of Impact	Resulting Risk Category	Is the residual ALARP?
C3	Impact on critical infrastructure due to construction works, including settlement	9 - Medium	Ch. 7 Human Health Ch. 8 Population Ch. 10 Water Ch. 11 Land and Soils (Soils, Geology & Hydrogeology) Ch. 12 Land Take Ch. 17 Infrastructure and Utilities	<ul style="list-style-type: none"> Best practice measures for the protection of third-party assets will be specified by TII and implemented by the Contractor on site; Where the works would directly impact on an asset, diversion strategies have been developed and agreed with asset owners; Where the works could potentially impact on assets through ground movements associated with the works, ground movement assessments have been prepared and will be developed further by the contractors prior to construction; <ul style="list-style-type: none"> Any required mitigations will be designed and agreed with the asset owner; Protective measures will be undertaken to keep the risk of utilities settlement to a minimum. Prior to excavation works being commenced, the latest service records will be sought, and localised confirmatory surveys will be undertaken to verify the locations of services. Where diversions, or modifications, are required to utility infrastructure, service interruptions and disturbance to the surrounding residential, commercial and/or community property may be unavoidable. Any disruption will be minimised and planned in advance by the appointed contractor; and Emergency accesses along the route of the proposed Scheme will be retained insofar as is possible throughout the Construction Phase. Where construction works for the proposed Scheme will interface with emergency access arrangements, the appointed contractor will consult with the affected landowners / site operators and the emergency services to agree, where required, alternative emergency access arrangements and changes to response plans for the duration of the works. 	1 – Ext. Unlikely	2 – Limited	3 – Low	Yes
C4	Major road traffic accident	9 - Medium	Ch. 7 Human Health Ch. 8 Population Ch. 18 Traffic and Transport	<ul style="list-style-type: none"> All temporary traffic measures required during the Construction Phase are outlined in the CTMP which will be updated by the appointed contractor; and Designated haul routes defined in the CTMP to be followed. All HGV loads will be covered or tied securely before leaving and coming to site. Refer to the CTMP (Appendix A6.2 of this EIAR). 	3 – Unlikely	2 – Limited	6 – Low	Yes
C5	Spillage or long-term seepage of pollutants into watercourse	8 - Medium	Ch. 7 Human Health Ch. 8 Population Ch. 9 Biodiversity Ch. 10 Water Ch. 11 Land and Soils (Soils, Geology & Hydrogeology) Ch. 12 Land Take	<ul style="list-style-type: none"> Refer to mitigation and management measures outlined in Chapter 10 (Water); and A SWMP and CEMP have been prepared and will be updated by the Contractor, having regard to best practice guidance. 	2 – V. Unlikely	3 – Serious	6 – Low	Yes
C7	Collapse / Damage to structures	8 – Medium	Ch. 7 Human Health Ch. 8 Population Ch. 11 Land and Soils (Soils, Geology & Hydrogeology) Ch. 12 Land Take Ch. 17 Infrastructure and Utilities Ch. 18 Traffic and Transport Ch. 20 Cultural Heritage	<ul style="list-style-type: none"> Compliance with design standards that include, but is not limited to, the following: EN 1990 Eurocode - Basis of structural design, EN 1993 Eurocode 3. Design of steel structures, EN 1993-1 Design of steel structures. General rules and rules for buildings, Degree of impact protection; and Compliance with material standards to include, but is not limited to, the following: I.S. EN 1992-1-1:2005 (Eurocode 2, Part 1-1) – Design of concrete structures – General rules and rules for buildings.; I.S. EN 1993-1-1:2005 (Eurocode 3, Part 1-1) – Design of steel structures General Rules and rules for buildings.; I.S. EN 1996-1-1:2005 (Eurocode 6, Part 1-1) – Design of masonry structures. General Rules for reinforced and unreinforced masonry structures. 	1 – Ext. Unlikely	2 – Limited	3 – Low	Yes
O1	Luas Finglas derailment	12 – Medium	Ch. 7 Human Health Ch. 8 Population Ch. 9 Biodiversity Ch. 10 Water Ch. 11 Land and Soils (Soils, Geology & Hydrogeology)	<ul style="list-style-type: none"> Design measures accepted by the regulator (CRR) to manage risks to be ALARP in order for licence to be granted including: CRR; CRR-G-016-C Guideline for Application for Acceptance of New Light Rail Rolling Stock; and CRR-G-032-B Guideline for Application for Acceptance of New Light Rail Works or New Light Rail Rolling Stock; All equipment will be compliant with Electromagnetic Compatibility and Interference (EMC and EMI) standards as required under the relevant EU standards; Mitigate by design and periodic inspections and maintenance as part of the Operational Strategy. Operation and maintenance manuals communicated early, robustly completed, and maintained; 	1 – Ext. Unlikely	5 - Catastrophic	5 – Low	Yes

ID	Risk Event	Pre-Mitigation Risk Score	Are cross-disciplinary impacts likely?	Key Risk Management and Mitigation Measures to Demonstrate Risk to be as low as reasonably practicable (ALARP)	Post Mitigation Likelihood	Consequence of Impact	Resulting Risk Category	Is the residual ALARP?
			Ch. 16 Electromagnetic Compatibility and Interference Ch. 17 Infrastructure and Utilities Ch. 18 Traffic and Transport Ch. 20 Cultural Heritage	<ul style="list-style-type: none"> Training to be provided, sufficient resources to be in place and compliance with best practice guidelines and procedures including compliance with EN 1991-1-7:2006: General Actions: Accidental Action and Road Drainage and the Water Environment (TII, 2015). Safe system of working; Design to appropriate environmental parameters (i.e., wind and water), including designed-in consideration of climate change including compliance with EN 1991-1-4:2005: General Actions: Wind Actions and International and National guidance and best practice; Equipment failure will be corrected as quickly as possible, and the action taken dependent on the nature of the failure; CCTV installation at Stops monitoring open section lines, for real-time monitoring. High integrity of safety critical functions required in reference and detailed design; and Reinforcement of the passenger visual signalling and the security in the fencing surrounding the LRV access and the operational line. 				
O2	Fire and/or explosion, either direct or indirect harm	8 – Medium	Ch. 7 Human Health Ch. 8 Population Ch. 9 Biodiversity Ch. 10 Water Ch. 13 Air Quality Ch. 20 Cultural Heritage	<ul style="list-style-type: none"> All construction materials used will be required to meet the requirements of BS EN 13501-1 Fire Classification of Construction Products and Building Elements. The constructed elements will be subject to fire testing in line with the requirements of Fire Resistance Test – General Requirements (BS EN 1363-1:2020 and EN 1992-1-2:2004 General Rules. Structural Fire Design; <ul style="list-style-type: none"> Safety features at Stops to minimise the risk of fire; Proposed emergency evacuation protocols to be adopted for emergency events along the railway line and at Stops; and The proposed Scheme design is in compliance with best practice, International, National and TII guidance. 	1 – Ext. Unlikely	5 - Catastrophic	5 – Low	Yes
O3	Infectious disease	10 – Medium	Ch. 7 Human Health Ch. 8 Population Ch. 9 Biodiversity	<ul style="list-style-type: none"> An Incident Management Plan is prepared as part of CEMP and will be finalised and updated by the appointed contractor; and All guidance, standard operating procedures and control measures issued by the Government will be strictly adhered to. 	2 – V. Unlikely	4 – V. Serious	8 – Medium	Yes
O4	Hydrological event – heavy and prolonged rainfall entering Stops and adjacent lands and watercourses	12 – Medium	Ch. 7 Human Health Ch. 8 Population Ch. 10 Water Ch. 13 Air Quality Ch. 17 Infrastructure and Utilities Ch. 20 Cultural Heritage	<ul style="list-style-type: none"> The appointed contractor will be required to include a flood response plan within the EIRP to detail the procedures to be taken in the event of a flood. Site staff will maintain awareness of flood and weather forecasts on an ongoing basis as well as receiving warnings from Dublin City Council, Fingal County Council and Met Éireann as appropriate so advance measures can be put in place; Drainage design includes allowances for climate change ensuring that the proposed Scheme is protected from significant flood events. Refer to the Chapter 10 (Water); and Cooperation with the relevant authorities, such as the local authorities and the OPW will be undertaken. Regular inspections and maintenance of drainage system and attenuation ponds will be undertaken. 	2 – V. Unlikely	3 – Serious	6 – Low	Yes

Note - The ID tags “C” and “O” represents the Construction and Operation phase, respectively.

Table 22-10 summarises the residual risks after the mitigation and management measures identified in Table 22-9 have been applied. Section 22.7 describes the residual risks in further detail.

Table 22-10: Evaluation of Level of Significance - Post-Mitigation

	Consequence of Impact					
		1 – Minor	2 – Limited	3 – Serious	4 – V. Serious	5 - Catastrophic
Likelihood	5 – V. Likely					
	4 – Likely					
	3 – Unlikely		C4: Major Road traffic accident.			
	2 – V. Unlikely			C5: Spillage or long-term seepage of pollutants into watercourse O5: Hydrological event.	O3: Infectious disease	
	1 – Ext. Unlikely		C3: Impact on critical infrastructure due to construction works including settlement; C7: Collapse / Damage to structures.			O1: Luas Finglas derailment O2: Fire and/or explosion, either direct or indirect harm
Note - The ID tags “C” and “O” represents the Construction and Operation phase, respectively.						

22.6.3 Monitoring

The CEMP is a live document that will need to be altered during the lifecycle of the Construction Phase to take account of monitoring results, permits, legislative changes, outcomes of third-party consultations etc. The appointed contractor will ensure that the CEMP remains up to date for the duration of the Construction Phase.

As part of the CEMP, an EIRP has been prepared to ensure that in the unlikely event of an incident (environmental or non-environmental), response efforts are prompt, efficient, and suitable for the particular circumstances.

It will be a condition of the Employer's Requirements that the successful contractor, immediately following appointment, must detail in the CEMP, the manner in which it is intended to effectively implement all the applicable mitigation measures identified in this EIAR and any additional measures required pursuant to conditions imposed by the Board to any grant of approval.

The CEMP details procedures that could be undertaken in the event of a significant release of sediment into a watercourse, or a significant spillage of chemical, fuel or other hazardous substances (e.g. concrete), a non-compliance incident with any permit or licence, or other such risks that could lead to a major pollution incident, including flooding. Successful implementation of CEMP will ensure that all mitigation measures

and monitoring requirements are carried out and thereby ensuring all potential risks are kept to the level of As Low As Reasonably Practicable.

22.7 Residual Impacts

Following the implementation of mitigation measures, there remains a risk of significant impacts associated with the proposed Scheme being vulnerable to infectious disease.

During the Operational Phase, for those vulnerable risks that cannot be completely designed-out, emergency plans will be available to deal with the response to an emergency in order to minimise the significance of any impacts.

The classification of consequence has been set as 'Very Serious' in acknowledgement of the significant impacts an outbreak of infectious diseases can have, such as the pandemic of COVID-19.

During the Operational Phase, in the event of an incident such as the COVID-19 pandemic, it is anticipated that all non-essential maintenance work and walkovers/inspections would be postponed. Services would be reduced, with reduced capacity and being used by essential workers only or as required by the Government. All guidance and direction provided by the relevant Department (i.e., Department of Health) would be followed and any required additional biosecurity measures or restrictions would be implemented.

Overall, it can be considered that the risk of impacts from an infectious disease will be managed to be as low as reasonably practicable (ALARP).

22.8 Conclusion

Given the processes that will be in place, and the resulting measures that will be introduced to avoid and/or reduce the vulnerability of the proposed Scheme to MANDs, it is considered that the risks of any such event occurring will be managed to be ALARP. The application of the ALARP principle for the management of railway safety risks is an accepted principle used widely by the Commission for railway regulation (CRR) and Health and Safety Authority.

As a result, it is considered that there will not be any likely significant environmental effects arising from the vulnerability of the proposed Scheme to major accidents and disasters.

As required under the Commission for Railway Regulation (2019), and in accordance with Directive 2012/34/EU of the European Parliament and of the Council of 21 November 2012 establishing a single European railway area (as amended), the CRR will only authorise the proposed Scheme once appropriate safety certifications have been obtained from the CRR as the national safety authority.

The measures in place to avoid and/or reduce the vulnerability of the proposed Scheme to MANDs will be considered and be subject to review under other legislative processes in addition to those put in place by the Railway Order.

22.9 Cumulative Impacts

The cumulative assessment of relevant plans and projects has been undertaken separately in Chapter 24 of this EIAR.

22.10 Difficulties Encountered in Compiling Information

There were no difficulties encountered when completing this chapter.

22.11 References

- CIRIA, 2023. *Environmental good practice on site guide (fifth edition)*, s.l.: CIRIA.
- CRR, 2020. *CRR-G-016-C Guideline for Application for Acceptance of Light Rail Rolling Stock*, Ireland: Commission for Railway Regulation.
- CRR, 2020. *CRR-G-032-B Guideline for the Application for Acceptance for New Light Rail Works or New Light Rail Rolling Stock*, Ireland: Commission for Railway Regulation.
- CRR, 2020. *CRR-G-033-C Guideline for Application of New Light Rail Works*, Ireland: Commission for Railway Regulation.
- DCC, 2015. *Major Emergency Plan*, Dublin: Dublin City Council.
- DECLG, 2015. *A Framework for Major Emergency Management. Guidance Document 10.*, Ireland: Government of Ireland.
- DEHLG, 2010. *A Guide to Risk Assessment in Major Emergency Management*, Ireland: Government of Ireland.
- Department of Defence, 2020. *Strategic Emergency Management (SEM) National Structures and Framework*, Dublin: Department of Defence; Office of Emergency Planning.
- DHLGH, 2021. *A framework for major emergency management*, Ireland: Government of Ireland.
- DT & DoEHLG, 2005. *Maximum Aircraft Movement Data and the Calculation of Risk and PSZs: Dublin Airport*, Dublin: Government of Ireland.
- EC, 2017. *Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report*, s.l.: European Commission.
- EPA, 2014. *Guidance on assessing and costing environmental liabilities*, s.l.: Environmental Protection Agency.
- EPA, 2015. *Draft Advice Notes for Preparing Environmental Impact Statements*, Ireland: Environmental Protection Agency.
- EPA, 2022. *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*, Ireland: Environmental Protection Agency.
- EU, 2014. *Directive 2014/52/EU of 16 April 2014 on the assessment of the effect of certain public and private projects on the environment*. s.l.: European Union.
- FCC, 2023. *Major Emergency Plan*, Dublin: Fingal County Council.
- Federation, I. C., 2019. *Essential Aggregates Providing for Ireland's Needs to 2040*, s.l.: s.n.
- Gol, 2021. *A National Risk Assessment for Ireland 2020*, Ireland: Government of Ireland.
- IEMA, 2020. *Major Accidents and Disaster in EIA: A Primer*, UK: Institute of Environmental Management and Assessment.
- NRA, 2007. *Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan*, Ireland: National Roads Authority.

Directives and Legislation

Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EU.

Directive 2012/34/EU of the European Parliament and of the Council of 21 November 2012 establishing a single European railway area (as amended).

Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.

Number 10 of 1996 – Waste Management Act, 1996.

Number 10 of 2005 - Safety, Health, and Welfare at Work Act 2005.

S.I. No. 138/2012 - Building Regulations (Part A Amendment) Regulations 2012.

S.I. No. 209/2015 – Chemical Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015.

S.I. No. 291 of 2013 - Safety, Health, and Welfare at Work (Construction) Regulations 2013.

S.I. No. 299/2007 - Safety, Health, and Welfare at Work (General Application) Regulations 2007

