Chapter 24
Major Accidents and Disasters

CONTENTS

24. MAJOR ACCIDENTS & DISASTERS

24.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) identifies, describes, and presents an assessment of the likely significant effects on the environment arising from the vulnerability of the Proposed Development to risks of major accidents and/or natural disasters. The assessment will examine the potential impacts during the Construction and Operational Phases of the DART+ Coastal North Project.

The assessment has been prepared in accordance with the requirements of Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (as amended by Directive 2014/52/EU ("the EIA Directive"). Coordination with and input from the relevant EIA experts and their respective discipline chapters of this EIAR has informed this assessment to ensure that the major accidents and disasters (MAD) identified are adequately assessed.

The assessment presented is informed by the following EIAR chapters and supporting documents:

- Chapter 4 Description of the Proposed Development;
- Chapter 5 Construction Strategy;
- Chapter 6 Traffic and Transportation;
- Chapter 7 Population;
- Chapter 8 Biodiversity;
- Chapter 9 Land and Soils;
- Chapter 10 Water (including Hydrology & Flood Risk);
- Chapter 11 Hydrogeology;
- Chapter 12 Air Quality;
- Chapter 13 Climate;
- Chapter 14 Noise and Vibration;
- Chapter 18 Material Assets: Utilities;
- Chapter 19: Resource and Waste Management;
- Chapter 23: Human Health; and
- Appendix A10.1 Flood Risk Assessment.

The DART+ Coastal North project is providing rail infrastructure which will enable an increase in frequency and capacity on the Northern Line and the Howth Branch in the coming years. It is not intended that this infrastructure will be decommissioned, but rather, as the infrastructure reaches the end of its design life, it will likely be refurbished or renewed to enable continued operation of the railway. Any such future renewal or refurbishment may require additional construction works, which would be similar to, but of a much lesser impact (in terms of extent and duration) than, the Construction Phase associated with the DART+ Coastal North project.

24.2 Legislation, Policy and Guidance

The key legislation, policy and guidance specific to the Major Accidents and Disaster chapter which has informed the assessment is outlined below.

This Chapter of the EIAR has been prepared in accordance inter alia with the Transport (Railway Infrastructure) Act 2001 (as amended) ("the 2001 Act") which provides for the making of a Railway Order application by Córas Iompair Éireann (CIÉ) to An Bord Pleanála. The European Union (Railway Orders) (Environmental Impact Assessment) (Amendment) Regulations 2021 (S.I. No. 743 of 2021) gives further effect to the transposition of the EIA on the assessment of the effects of certain public private projects on the environment by amending the 2001 Act. The 2001 Act as amended (including by Statutory Instrument No. 743 of 2021) at Section 37 requires, inter alia, that the application be made in writing and be accompanied by:

- A draft of the proposed Railway Order;
- A plan of the proposed railway works;
- A book of reference to a plan describing the works which indicates the identity of the owners and of the occupiers of the lands described in the Plan; and
- A report on the likely effects on the environment of the proposed railway works.

A report of the likely effects on the environment of the proposed railway works is addressed by the preparation of this Environmental Impact Assessment Report (EIAR) (previously referred to as an Environmental Impact Statement in Section 39 of the 2001 Act prior to the amendments effected by S.I. No. 743/2021). As mentioned, this EIAR is based on a coordinated approach in order to facilitate An Bord Pleanála carrying out a coordinated assessment with any assessment under the Habitats Directive (Council Directive 92/43/EEC of 21 May 1992) or the Birds Directive (Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009).

By virtue of Section 38 of the 2001 Act the development the subject matter of a Railway Order is deemed to be exempted development (under the Planning and Development Act 2000 (as amended)) and the provisions of Part IV of the Planning and Development Act 2000 are disapplied where the works involved are authorised by a Railway Order.

An examination, analysis and evaluation is carried out by the Board in order to identify, describe and assess, in the light of each individual case, the direct and indirect significant effects of the proposed railway works, including significant effects derived from the vulnerability of the activity to risks of major accidents and disasters relevant to it, on: population and human health; biodiversity, with particular attention to species and habitats protected under the Habitats and Birds Directives; land, soil, water, air and climate; material assets, cultural heritage and the landscape, and the interaction between the above factors.

In accordance inter alia with Section 39 of the 2001 Act and the provisions of the EIA Directive, CIÉ, as the Applicant for this Railway Order, has ensured that the EIAR is prepared by competent experts; contains a description of the proposed railway works comprising information on the site, design, size and other relevant features of the proposed works; contains a description of the likely significant effects of the proposed railway works on the environment; contains the data required to identify and assess the main effects which the proposed railway works are likely to have on the environment; contains a description of any features of the proposed railway works, and of any measures envisaged, to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment; contains a description of the reasonable alternatives studied by the applicant – here CIÉ – which are relevant to the proposed railway works and their specific characteristics, and an

indication of the main reasons for the option chosen, taking into account the effects of the railway works on the environment; contains a summary in non-technical language of the above information; takes into account the available results of other relevant assessments under European Union or national legislation with a view to avoiding duplication of assessments.

In addition to and by way of explanation or amplification of the specified information referred above, the EIAR contains such additional information specified in Annex IV to the EIA Directive relevant to the specific characteristics of the particular railway works, or type of railway works, proposed and to the environmental features likely to be affected and in this regard Annex IV sets out the information which is referred to in Article 5(1) of the EIA Directive. Further the EIAR includes the information that may reasonably be required for reaching a reasoned conclusion in accordance with section 42B of the 2001 Act on the significant effects of the proposed railway works on the environment, taking into account current knowledge and methods of assessment. This assessment has been undertaken in accordance with the above legislative and regulatory regime.

Accordingly, 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*"

In addition (as mentioned above), Annex IV (information for the EIAR) of the EIA Directive states than an EIAR shall 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 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 EIA Directive (as amended) 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 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*."

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/EC ("the Major Accidents Directive" or "the Seveso III Directive") 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 "COMAH Regulations"), implements the Seveso III Directive.

The Seveso III Directive and 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 ("the 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. Further details of relevant consultation zones are provided in Section 24.4.

24.3 Methodology

24.3.1 Scope

The EIA Directive sets out the requirement to carry out an assessment of the vulnerability of the Proposed Development to major accidents and disasters. A detailed assessment of potential accidents and disasters in relation to surface water and groundwater pollution along with flooding events has been included in the relevant chapters in this EIAR.

The assessment will follow a risk-based approach in line with the recent publication from the Institute of Environmental Management and Assessment - Major Accidents and Disasters in EIA: A Primer (IEMA, 2020) hereafter referred to as the IEMA Primer. The potential 'Risk Events' are grouped based on their likelihood and consequence and it is determined whether the risks are managed and/or mitigated to 'as low as reasonably practicable (ALARP)' level.

This chapter of the EIAR differs from other specialist chapters of the EIAR, in that this chapter follows a risk assessment methodology, while other specialist chapters identify the potential for "*likely significant effects*" of the Proposed Development on the environment. The scope of this chapter and assessment deals with associated risk events of the Proposed Development that have a low likelihood to occur but will have a potentially high consequence on the environment, human health, infrastructure, and/or cultural heritage. The IEMA Primer (2020) approach 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*" (refer to page 6 of IEMA Primer) and this approach has been adopted for the purposes of this assessment.

The events with high likelihood and high consequence (high risk) and the low impact events irrespective of the likelihood (low-risk) are scoped-out of the assessment as per the approach recommended by the IEMA Primer (2020). The summary of risk events considered in the scope of the assessment is outlined in Image 24-1.

This chapter does not deal with the impacts of gradual trends associated with climate change, e.g. sea level rise or increasing annual rainfall volumes. It does, however, address sudden events whose frequency may be increased as a result of climate change related trends, e.g. extreme weather events.

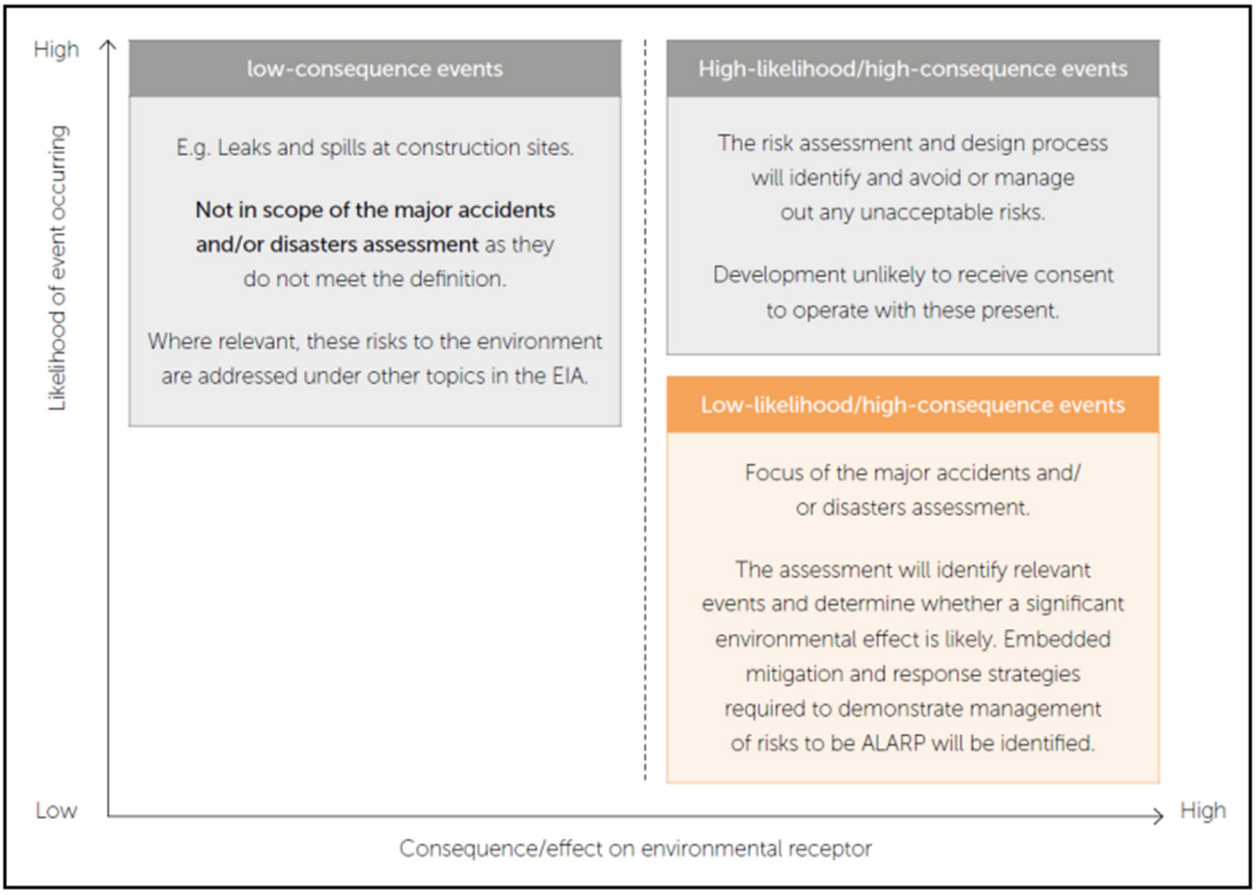

Image 24-1 Summary of Risk Events Considered in the Scope of the impact Assessment in Relation to Major Accidents and Disasters (Source: IEMA Primer, 2020)

24.3.2 Definitions

For the purpose of this assessment, the following definitions from the IEMA Primer, as provided in Table 24-1, have been adopted.

Table 24-1 Key Definitions for the Assessment of MAD (adopted from IEMA Primer, 2020)

Term	Definition
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.

Term	Definition
Disaster	May be a natural hazard (e.g., earthquake) or a man-made/external hazard (e.g. act of terrorism) with the potential to cause an event or situation that meets the definition of a major accident
Hazard	Something with the potential to cause harm. Hazards can be natural or man-made in nature. Natural hazards include, but are not limited to earthquake, flooding, landslide, high winds/storm, wildfire. Man-made hazards include, but are not limited to structural collapse, building collapse, explosion, terrorism, cyber-attack
Receptors	The specific component of the environment that could be adversely affected if the source reaches it. Environmental receptor is specifically defined as: features of the environment that are subject to assessment under Article 3 of the EIA Directive, namely population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage and landscape.
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.
Sensitivity	The sensitivity of a receptor is a function of its value, and capacity to accommodate change reflecting its ability to recover if it is affected. It is typically defined by the following factors: Adaptability – the degree to which a receptor can avoid, adapt to or recover from an effect; Tolerance – the ability of a receptor to accommodate temporary or permanent change; and Recoverability – the temporal scale over, and extent to, which a receptor will recover following an effect.
Magnitude of Impact	The sensitivity of a receptor is a function of its value, and capacity to accommodate change reflecting its ability to recover if it is affected. It is typically defined by the following factors: Adaptability – the degree to which a receptor can avoid, adapt to or recover from an effect; Tolerance – the ability of a receptor to accommodate temporary or permanent change; and Recoverability – the temporal scale over, and extent to, which a receptor will recover following an effect.
Adaptive Capacity	The capacity of receptors to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.
Risk	The likelihood of an impact occurring, combined with the effect or consequence(s) of the impact on a receptor if it does occur.
Source-pathway-receptor linkage	For a risk to arise there must be hazard that consists of a 'source' (e.g. high rainfall); a 'receptor' (e.g. people, property, environment); and a pathway between the source and the receptor (e.g. flood routes).
Likelihood	In risk management terminology, the word 'likelihood' is used to refer to the chance of something happening.
Significant environmental effect (in relation to a major accident and/ or disasters assessment)	Could include the loss of life, permanent injury and temporary or permanent destruction of an environmental receptor which cannot be remediated through minor clean-up and restoration

Term	Definition
As Low As Reasonably Practicable (ALARP)	Involves weighing a risk against the trouble, time and money needed to control it. Thus, ALARP describes the level to which risks are typically controlled.

24.3.3 Receptors

The assessment of significant adverse effects considers all environmental factors defined in Article 3 of the 2014 EIA Directive (as amended). For the purpose of this assessment, an environmental receptor is therefore considered to be any of the following relevant receptors:

- The population located along the alignment of the existing railway line (outlined in Chapter 4 Description of Proposed Development) and in the vicinity of the proposed works including members of the public, rail users, IÉ employees and local communities;
- Infrastructure and the built environment;
- The natural environment, including:
    - Biodiversity;
    - Land quality, soils and agriculture;
    - Air quality;
    - Water resources (surface and groundwaters); and
    - Landscape and visual sensitive receptors;
- The historic environment, including:
    - Archaeology; and
    - Built heritage.

24.3.4 Assessment Methodology

In accordance with the approach presented in the IEMA Primer (IEMA, 2020) this assessment follows a three-stage methodology as follows:

- Stage 1 Screening.
- Stage 2 Scoping.
- Stage 3 Assessment.

24.3.4.1 Stage 1 Screening

According to the IEMA Primer, at the EIA screening stage "*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*".

The following questions can be useful to guide the screening exercise (adapted from IEMA Primer, 2020):

1) Can the Proposed Development prove to be a source of hazard itself that can possibly lead to a major accident and/or disaster?
2) Is there any interaction that will occur between the Proposed Development and any sources of external hazards that may make it vulnerable to a major accident and/or disaster?
3) If an external major accident and/or disaster occurred, would the existence of the Proposed Development plausibly increase the risk of a significant effect to an environmental receptor occurring?

Since the Proposed Development requires a mandatory EIA (i.e. it is not a sub-threshold development), a detailed EIA screening assessment was not required. Accordingly, the screening exercise in respect of MAD is presented herein.

24.3.4.2 Stage 2 Scoping

If the Proposed Development is screened in for the assessment of impacts in relation to MAD at Stage 1, the scoping stage aims to determine in more detail whether there is potential for significant effects as a result of MAD in relation to the Proposed Development.

In relation to the Proposed Development, various hazard classes have been considered based on the Government of Ireland National Risk Assessment for Ireland 2020 (Government of Ireland, 2021) and UK National Register of Civil Emergencies (HM Government, 2020). The baseline (i.e. the receiving) environment is described insofar as is relevant to the hazard class in question.

The IEMA Primer (IEMA 2020) states that "*A major accidents 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*".

An impact assessment for major accidents and/or disasters can be scoped out if it can be demonstrated 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; or*
- *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." (IEMA, 2020; p. 12).*

Image 24-2 presents the infographic of the scoping process from the IEMA Primer 2020.

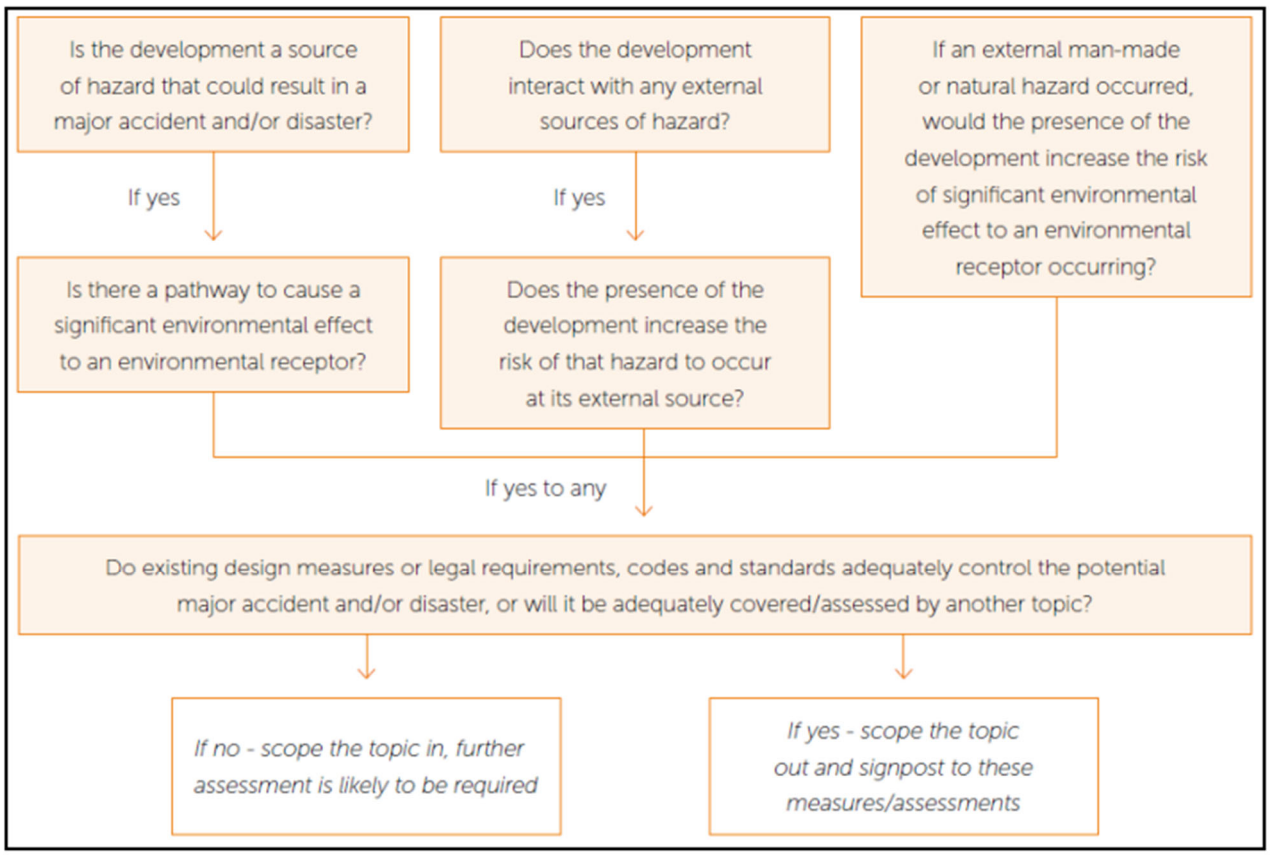

Image 24-2 Scoping Decision Process Flow (Source: IEMA Primer, 2020)

Following Stage 1, the Proposed Development screened in for mandatory EIA. An EIA Scoping Report was prepared and issued to environmental stakeholders in March 2023 as part of an informal scoping process. This report is available in Appendix A1.1 EIA Scoping Report in Volume 4 of this EIAR. A full list of prescribed bodies and stakeholders is included under Table 4-1 (Section 4.9.1) of the report.

24.3.4.3 Stage 3 Assessment

Risk Identification

If hazard class(es) are screened in at Stage 2, they are brought forward to Stage 3 for a detailed consideration of the potential for significant impacts to arise. At this stage, the following exercises are carried out in accordance with the IEMA Primer (IEMA 2020):

- The potentially affected receptors are identified with as much specificity as is practicable. If no receptors can be identified, the hazard class in question is excluded from further consideration, since there is no valid source-pathway-receptor linkage.
- The reasonable worst-case impacts on the receptors are identified insofar as possible. This exercise is based on a qualitative, professional judgement. Uncertainty at this stage is to be acknowledged. Hazard classes which are not predicted to result in significant impacts under this reasonable worst-case scenario are excluded from further consideration.
- Mitigation by design (where appropriate) are identified and it is determined whether these are sufficient to mitigate the associated risk level(s) to be ALARP.

If, after all of the above-stated exercises have been carried out, it remains that there are hazard classes which may potentially give rise to significant effects as a result of, or due to, interaction with the Proposed Development, it is considered whether secondary mitigation measures can be incorporated into the design of the Proposed Development which would mitigate the associated risk level(s) to be ALARP.

Risk Classification

The remaining hazard classes with associated risks are evaluated using criteria outlined in Table 24-2 and Table 24-3, which are adapted from the criteria applied by the Department of Defence in '*A National Risk Assessment for Ireland 2020'* (Government of Ireland, 2020). Table 24-2 presents the classification of the likelihood of events to occur and the assigned rating.

Table 24-2 Classification of Likelihood (adapted from DoD, 2020)

Rating	Classification	Description
1	Extremely Unlikely	The likelihood of occurrence is 100 or more years between events.
2	Very Unlikely	The likelihood of occurrence is 51-100 years between events
3	Unlikely	The likelihood of occurrence is 11-50 years between events
4	Likely	The likelihood of occurrence is 1-10 years between events.
5	Very Likely	Ongoing / less than one year between occurrences.

Table 24-3 outlines the classification of potential impacts resulting from MAD based on 'A National Risk Assessment for Ireland 2020' (DoD, 2020) and the EPA Guidelines (EPA 2022).

Table 24-3 Classification of Potential Impact (adapted from DoD, 2020 and EPA, 2022)

Rating	Classification of Potential Impact (DoD, 2020)	Significance of Effects (EPA, 2022)	Description
1	Very Low Impact	Slight	• Human Health: minor injuries only, or chance of deaths/ critical injury less than 1 in 250,000 people, or serious injuries less than 1 in 100,000 or minor injuries only; • Environment: simple, localised impact; • Economic: up to 1% of Annual Budget; and, • Socio-economic: Limited disruption to community.
2	Low Impact	Moderate	• Human Health: chance of deaths/ critical injury greater than 1 in 250,000 people, or serious injuries greater than 1 in 100,000; • Environment: simple, regional impact, short-term impacts; • Economic: greater than 1% of Annual Budget; and • Socio-economic: affected community is functioning with considerable inconvenience
3	Moderate Impact	Significant	• Human Health: chance of deaths/ critical injury greater than 1 in 100,000 people, or serious injuries greater than 1 in 40,000; • Environment: heavy contamination, localised effects of extended duration; • Economic: greater than 2% of Annual Budget; and • Socio-economic: affected community is functioning poorly.
4	High Impact	Very Significant	• Human Health: chance of deaths/ critical injury greater than 1 in 40,000 people, or serious injuries greater than 1 in 20,000; • Environment: heavy contamination, widespread and/or long- term impacts; • Economic: greater than 4% of Annual Budget; and • Socio-economic: affected community is partially functioning.
5	Very High Impact	Profound	• Human Health: chance of deaths/ critical injury greater than 1 in 20,000 people; • Environment: very heavy contamination, widespread and/or long-term impacts; • Economic: greater than 8% of Annual Budget; and • Socio-economic: affected community cannot function without significant support.

Risk Evaluation

The evaluation of risks is carried out by means of a risk matrix. A risk matrix is created to assign a "Level of Significance" rating to each Risk/ Event based on the likelihood and the consequence of the impacts. The matrix is colour coded to provide an indication of the critical nature of the risks under assessment. The matrix has been developed following the guidelines from the Department of

Defence (DoD, 2020) and amended by the provisions established in the IEMA Primer (IEMA 2020) and EPA Guidelines (EPA, 2022).

The assessed risks have been grouped into three categories outlined below, and as shown in Table 24-4:

- Red Zone: High Risk Scenarios that have an evaluation score of 15 to 25;
- Orange Zone: Medium Risk Scenarios that have an evaluation score of 8 to 12; and
- Green Zone: Low Risk Scenarios that have an evaluation score 1 to 6.

Table 24-4 Evaluation of the Level of Significance

Likelihood	Impact Consequence					
	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 - Extremely Unlikely	1	2	3	4	5
		1 - Slight	**2 - Moderate**	**3 - Significant**	**4 - Very Significant**	**5 - Profound**

The major accidents and disasters are categorised based on the above three categories and the level of significance ratings are presented in Section 24.5.3. The IEMA Primer (IEMA 2020) recommends that the aim of the MAD assessment is to identify and assess the hazard types which are of low likelihood but potentially high consequence events. These are generally represented by the Orange Zone.

The Red Zone consists of hazard types / events which are high likelihood and high consequence events. Events that have a high likelihood and a high consequence rating are considered to be unacceptable. A development is unlikely to receive planning consent to operate with such high levels of significance and these risk events would be managed by the design process.

Hazard types within the Green Zone are considered to have achieved ALARP and therefore are not assessed further.

24.3.5 Survey Methodology

Information was obtained from the desktop studies and surveys completed for the environmental factors contained within other chapters of this EIAR (e.g., Hydrogeology, Air Quality, etc.) and inform this assessment as appropriate.

24.3.6 Consultation

The main consultation stages as part of the project development include the following:

- Pre-Application Consultation with An Bord Pleanála;
- Consultation on the Emerging Preferred Option - Non-statutory Public Consultation no.1;
- EIA Scoping Report – Informal Scoping Consultation;
- Consultation on the Preferred Option - Non-statutory Public Consultation no.2; and
- Statutory consultation as part of the EIA / Railway Order application process.

Chapter 3 of this EIAR includes detail relating to the consultation undertaken during the project. All feedback was collated, including feedback specific to the EIAR topic 'Major Accidents and Disasters'. This feedback has informed this chapter as appropriate.

24.3.7 Difficulties Encountered / Limitations

This Chapter of the EIAR has been prepared based upon the best available information and in accordance with current best practice and relevant guidelines. There were no technical difficulties or otherwise encountered in the preparation of this chapter of the EIAR.

24.4 Study Area

For the purposes of identifying risk of major accidents and disasters the study area includes the extent of the Proposed Development, as well as any haul routes to and from the Proposed Development during the Construction Phase.

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

An assessment of upper tier Seveso sites in the vicinity of the Proposed Development and their respective consultation distances has been undertaken[1]. This is presented in Table 24-5.

Table 24-5 Seveso Site Assessment

Name	Location	Approximate distance from the Proposed Development	Consultation Zone distance	Scoped In / Out
Upper Tier Seveso sites				
Tedcastles Oil Products	3 Promenade Road, Tolka Quay, Dublin 3	1420m	400m	Out. Proposed Development outside consultation distance.

[1] Information in table checked against HSA website dated 21/05/2024.

Website: https://www.hsa.ie/eng/Your_Industry/Chemicals/Legislation_Enforcement/COMAH/List_of_Establishments/

Name	Location	Approximate distance from the Proposed Development	Consultation Zone distance	Scoped In / Out
Circle K Ireland Hoalding Ltd.	Promenade Road, Dublin Port, Dublin 3	1400m	600m	Out. Proposed Development outside consultation distance.
Calor Teoranta	Tolka Quay Rd, North Dock, Dublin	2100m	700m	Out. Proposed Development outside consultation distance.
Indaver Ireland Ltd.	Tolka Quay Rd, North Dock, Dublin	2100m	700m	Out. Proposed Development outside consultation distance.
National Oil Reserves Agency Limited	Poolbeg Oil Storage Terminal, Poolbeg, Dublin South Port.	4000m	500m	Out. Proposed Development outside consultation distance.
Valero Energy (Ireland Ltd.)	Dublin Joint Fuels Terminal, Alexandra Rd, Dublin Port, Dublin 1.	2000m	550m	Out. Proposed Development outside consultation distance.
Flogas Ireland Limited.	Drogheda Marine Terminal, Marsh Road, Stagreenan, Drogheda, Co. Louth, A92 TX03.	250m	650m	In. Proposed Development Construction Compound within consultation distance.

There is one upper tier Seveso site in proximity to the existing railway line, Flogas Ireland Limited (Drogheda).

There are also two EPA licensed facilities in proximity to the existing railway line, an Industrial Emissions (IE) facility: Newport Synthesis Ltd. (Baldoyle Industrial Estate, Grange Road, Baldoyle, Dublin 13, Dublin) [EPA Licence: P0097-01] and a landfill site: Balleally Landfill (Balleally, Lusk, Dublin) [EPA Licence: W0009-03].

24.5 Description of Potential Impacts

24.5.1 Stage 1 – Screening

The Proposed Development has been screened in for impact assessment in relation to major accidents and disasters on the basis of consideration of its nature, scale and construction duration, and the receiving environment. The screening has determined that it is conceivable (although highly unlikely) that:

- The Proposed Development could result in a major accident and/or disaster;
- The Proposed Development could interact with external sources of hazards (non-project related) that could plausibly make it vulnerable to a major accident and/or disaster; and
- Should an external (non-project related) major accident or disaster occur, the Proposed Development could plausibly exacerbate the associated risk of significant impacts.

24.5.2 Stage 2 – Scoping

In general, major accident and disaster events, as they relate to the Proposed Development, will fall into three categories:

- Events that could not realistically occur, due to the type of development or its location.
- Events that could realistically occur, but for which the Proposed Development, and associated receptors, are no more vulnerable than any other development.
- Events that could occur, and to which the Proposed Development is particularly vulnerable, or which the Proposed Development has a particular capacity to exacerbate.

The scoping stage was undertaken primarily to identify this third group of major events, which would then form the shortlist of events to be taken forward for further consideration. The screening exercise undertaken for the long list of events is documented in Table 24-6.

Table 24-6 Scoping Assessment of Potential Sources of Major Accidents and Disasters (Adapted from IEMA Primer)

Hazard Type	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Progress to Stage 3?
Construction Phase				
Transport Accidents				
Major Road Traffic Accidents	Yes	There is a risk of a road traffic accident occurring during the construction stage along haulage routes due to increased levels of Heavy Goods Vehicles (HGVs) on motorways, national & urban roads. There will be a limited risk from the Proposed Development to cause a major road traffic accident along haulage routes due to in increased levels of construction traffic HGVs on motorways, national and urban roads, congestion, and traffic management during the construction stage. The risk of major traffic accidents occurring during the Construction Phase would be no different to other national routes.	• Human Health. • Biodiversity. • Water. • Population. • Material Assets Non-Agricultural.	**Yes**
Train derailment	Yes	The Proposed Development involves works on and adjacent to a live rail corridor. There is potential for rail accidents / derailment to occur during the construction of the Proposed Development from objects accidently falling onto the train / rail track during construction.	• Human Health. • Population. • Material Assets Non-Agricultural	**Yes**
Accidents when working with electrical equipment and / or in vicinity of rail line	Yes	The electrification of the rail line which currently terminates at Malahide, as far as Drogheda MacBride Station, involves the construction of OHLE equipment along c.37km section of the rail line. There is a risk of electrical accidents during Construction Phase when handling electrical equipment.	• Human Health.	**Yes**

Hazard Type	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Progress to Stage 3?
Infrastructure				
Impact on Critical Infrastructure	Yes	Construction activities for the Proposed Development may impact on existing overground and underground utilities.	• Population • Human Health • Hydrology • Hydrogeology • Material Assets Utilities • Material Assets - Agricultural	**Yes**
Collapse / Damage to structures	Yes	There are buildings and bridge structures in the vicinity of the proposed construction works. Works to existing structures will also be required. There is a risk of existing buildings / structures being damaged during the adjacent works or when works are to be carried out on structures, particularly on protected structures.	• Human Health • Material Assets Non-Agricultural • Architectural Heritage	**Yes**
Collapse / Tunnel Failure	Yes	The Proposed Development does not involve the construction of any tunnel structures.	• Human Health • Material Assets Non-Agricultural • Architectural Heritage	No

Hazard Type	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Progress to Stage 3?
Closure of railway line due construction accidents	Yes	There is potential for unplanned closures of railway services / level crossings in an event of an accident when working on or in close proximity to an active rail line. The railway line will remain closed until the railway line is clear which may affect commuter and freight services. This does not constitute a major accident or a disaster.	• Population	No
Construction Accidents				
Ground Collapse	Yes	The Proposed Development consists of works mainly within the existing railway line or within an urban environment. Extensive earthworks will be required during the Construction Phase where there may be a risk of ground collapse.	• Human Health • Land & Soils • Material Assets Non-Agricultural	**Yes**
Release of asbestos	Yes	The Proposed Development will require the demolition of existing bridge structures which may have asbestos containing materials (ACM) present, presenting a risk of release of asbestos, if present, during the Construction Phase. There is considered to be a risk from the Proposed Development to cause release of asbestos during the Construction Phase. There is considered to be no risk to the Proposed Development from other sources or activity causing release of asbestos during the Construction Phase.	• Human Health • Air Quality	**Yes**
Fire / Explosion	Yes	The Proposed Development will require the use of flammable substances such as fuel storage areas at construction compounds and also working with electricity. There is a limited risk from the Proposed Development to cause a major accident by fire/explosion caused by fuel/flammable liquids present or in use on site during the Construction Phase.	• Human Health • Population • Material Assets Non-Agricultural	**Yes**

Hazard Type	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Progress to Stage 3?
		There is a limited risk to the Proposed Development from other sources or activities in the vicinity to cause a major accident by fire or explosion during the Construction Phase (risk of explosion or fire from Seveso Sites considered separately).		
Works near surface or groundwater	Yes	The existing railway line crosses a number of waterbodies such as streams, rivers, and estuaries, namely (rivers Nanny, Delvin, Bracken, Mayne, Sluice, and Malahide and Rogerstown estuaries). Works near water pose a potential health and safety risk to construction workers and the general public.	• Human Health • Population • Hydrology • Biodiversity	**Yes**
Industrial Accidents				
Industrial Accidents (works near Seveso site)	Yes	The Proposed Development is in the vicinity of one Upper Tier Seveso site in proximity to the existing railway line (Refer to Section 24.4). Works will be confined to the existing railway corridor and supporting Construction Compounds and are not likely to cause damage to the Seveso site in an event of an accident. However, an explosion / fire from the Seveso site can present a risk to the development and construction workers. There is considered to be a low risk to the Proposed Development from accidents/disasters caused by nearby COMAH Establishments (Seveso Sites) due to the safety, health and management systems and procedures in place as required under the COMAH Regulations. In the event of an accident, the Seveso site will have an emergency response plan registered with the HAS.	• Human Health • Population	**Yes**

Hazard Type	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Progress to Stage 3?
Hydrological Disasters				
Extreme Weather (Flooding) Events	Yes	Extreme flood events (heavy rainfall events, storms, prolonged flooding of rivers and estuaries) have the potential to occur. This has the potential to impact on the construction sites which store construction material and equipment which are potential sources of contaminants. The project can exacerbate the risk of flooding during construction by temporarily increasing hard standing in areas that are currently greenfield. The construction works could increase the number of people working near known sources of flooding, thus increasing the potential for flood risk related impacts on human health.	• Biodiversity, • Material assets Agricultural • Material Assets Non-Agricultural • Population • Human Health • Water • Hydrogeology	**Yes**
Groundwater Contamination	Yes	The Proposed Development will require ground disturbance activities and will require the excavation of a large amount of earthworks required during construction. There is a potential risk from the Proposed Development to cause accidental spillage of hazardous materials (e.g., construction plant fuels, oils etc.) which has the potential to accidentally contaminate groundwater abstraction points. There is a limited risk to the Proposed Development from other sources or activity causing accident/impact in terms of groundwater contamination during the Construction Phase.	• Human Health • Population • Water • Hydrogeology • Biodiversity	**Yes**
Spillage or long-term seepage of pollutants into a watercourse	Yes	The existing railway line crosses a number of streams and river waterbodies. There is potential for accidental release of sediment-laden run-off or pollutants from machinery and plant to the watercourses during the Construction Phase.	• Population • Human Health • Hydrology	**Yes**

Hazard Type	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Progress to Stage 3?
			• Hydrogeology • Biodiversity	
Disease				
Animal and Plant Disease	Yes	Invasive species have been identified within the railway corridor. The likelihood of spread and the potential impact on native species varies. Depending on the likelihood of spread of these invasive species and the potential impact to native species, there is a risk of spread of invasive species during construction. This does not constitute a major accident or a disaster.	• Biodiversity • Human Health • Material Assets Agricultural • Material Assets Non-Agricultural	**Yes**
Human disease	Yes	There is a risk of spread of human disease amongst construction workers.	• Human Health • Population	**Yes**
Operational Phase				
Transport				
Major Road Traffic Accidents	Yes	There is a risk of major traffic accidents occurring during the Operational Phase of the Proposed Development due to the proposed modifications to the existing road network.	• Human Health • Population • Water • Biodiversity	**Yes**

Hazard Type	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Progress to Stage 3?
Rail accidents / Train derailment	Yes	The Proposed Development involves works within an existing rail corridor. There is a risk of rail accidents occurring during the Operational Phase of the development.	• Human Health • Population • Architectural Heritage • Material Assets Non-Agricultural	**Yes**
Electrical Accidents	Yes	The electrification of the rail line which currently terminates at Malahide, as far as Drogheda MacBride Station, involves the installation of OHLE equipment and substations along the c.37km section of the rail line. There is potential for the public to come in contact with the electrical equipment, during operation.	• Human Health	**Yes**
Aircraft Disasters	No	The Proposed Development does not have the potential to cause such an event. It would not be affected negatively by a major disruption of air travel, nor is it likely to exacerbate such an event.	N/A	No
Maritime Disasters	Yes	The Proposed Development is not considered to be particularly vulnerable to the effects of such an event, nor does it have the potential to exacerbate such an event.	N/A	No
Bridge Failure	Yes	The Proposed Development consists of modification works to existing bridge structures. There is a risk of bridge failure during the Operational Phase.	• Human Health. • Population	**Yes**
Tunnel Failure / Fire	Yes	The Proposed Development does not involve construction of any tunnels but involves modifications and lowering of the track beneath some underbridges and underpasses on the existing line.	• Human Health. • Population.	**Yes**

Hazard Type	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Progress to Stage 3?
Dam Failure	No	There is no dam proposed as part of the Proposed Development and none existing that would affect or be affected by the Proposed Development.	N/A	No
Flood Defence Failure	No	There are no existing flood defences that would affect or be affected by the Proposed Development.	N/A	No
Mast and Tower Collapse	No	There is no mast or tower proposed as part of the Proposed Development and none existing that would affect or be affected by the proposed development.	N/A	No
Building Failure / Fire	Yes	The Proposed Development involves modifications to existing Stations, as well as the provision of a total of 8 traction electrical substation buildings. There is a risk of building failure/ fire to occur at these locations during operation phase.	• Human Health • Population • Material Assets Non-Agricultural	**Yes**
Power Failure	Yes	The Proposed Development involves the electrification of c.37km of railway line and thus its operation is vulnerable to loss of electrical power to the network's new electric train fleet resulting in disruption to the service.	• Population • Material Assets Non-Agricultural	**Yes**
Fire within trains	Yes	The Proposed Development will electrify the track from Malahide through to Drogheda. The electrification of the track will result in a modal shift of the diesel-powered rail services. Both the future DART service and the existing intercity and commuter services (diesel powered fleet) will operate on the electrified lines. The introduction of new electrified fleet will not increase the transport usage of flammable substances. As such, the Proposed Development will not exacerbate the risk of fire within trains during the Operational Phase.	• Human Health	No
Safety Protection for members of the public	Yes	The Proposed Development will electrify an existing railway corridor. It involves the replacement / upgrade of existing bridge structures over the railway line.	• Population • Human health	**Yes**

Hazard Type	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Progress to Stage 3?
and users of structures (risk of falling)		The existing bridges along the route must comply with necessary safety requirements by providing suitable protection for the general public to prevent climbing or walking across parapets, reducing the risk of falling from structures.		
Geological Disasters				
Mass Wasting (Landslides, rockfalls, debris flows, mudflows, avalanches etc.)	Yes	The Proposed Development does not have the potential to cause such an event. There are no significant volumes of soil / rock / debris on slopes in the vicinity of the Proposed Development.	N/A	No
Earthquakes	No	The Proposed Development does not have the potential to cause an earthquake event. Seismic activity in and around Ireland is typically of low magnitude – although moderately damaging events of higher magnitude do occasionally occur, according to the Irish National Seismic Network, Ireland is the quietest place for seismic activity in Europe. Besides houses, no account could be found of any damage to infrastructure in Ireland as a result of a seismic event. The site is not in a geologically active area and as such, earthquakes are not considered to be a risk or serious possibility.	N/A	No
Sinkholes	No	The Proposed Development does not have the potential to cause such an event. The geology of the study area is not prone to sinkholes.	N/A	No
Volcanic Eruption	No	The Proposed Development does not have the potential to cause a volcanic event. There is no volcanic activity in Ireland.	N/A	No

Hazard Type	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Progress to Stage 3?
Hydrological Disasters				
Extreme weather (flood) events	Yes	There is a risk of the Proposed Development being vulnerable to and intensifying flooding in the area due to increase in hardstanding on currently greenfield land.	• Human Health • Material assets Agriculture • Water • Hydrogeology • Biodiversity	**Yes**
Spillage or long-term seepage of pollutants into a watercourse	Yes	The Proposed Development will not increase the number of fuel powered trains operating on the railway line and will therefore not exacerbate the risk of such an event. The Proposed Development will include new and improved surface water drainage networks incorporating Sustainable Drainage Systems (SuDS) as appropriate to temporarily store surface water runoff and allow it to infiltrate into the groundwater thus preventing excessive stormwater flows into nearby watercourses.	• Human Health • Water • Hydrogeology • Biodiversity	No
Tsunami / Storm surge	No	The Proposed Development does not have the potential to cause a tsunami / storm surge event. There is a risk of storm surge events along the railway line, particularly at estuary crossings (e.g., Malahide/Rogerstown), although all infrastructure design levels are above flood levels, and the risk of major accidents or disaster as a result of a storm surge event is considered to be low. A Site Specific Flood Risk Assessment has been completed for the Proposed Development. Refer to the Flood Risk Assessment Report (Appendix A10.1) within Volume 4 of this EIAR.	N/A	No

Hazard Type	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Progress to Stage 3?
		'Historical records and geological evidence indicate that, while tsunamis are unlikely to occur around Ireland, the Irish coast is vulnerable to tsunamis from submarine landslides and distant earthquakes' (Government of Ireland, 2021). Further, 'The risk of tsunami in Ireland is included as a Low Probability High Impact (LPHI) risk…' (Government of Ireland, 2021).		
Extreme Weather Events				
Extreme weather (Severe snowfall / blizzards / hailstorm) event	No	The Proposed Development does not have the potential to cause such an event. Severe snowfall / blizzard and hailstorm events could affect the operation of the proposed DART+ Coastal North and its users. However, the risk is no different from other transport electrification developments in Ireland. The Proposed Development will be designed to operate under a range of environmental conditions, in accordance with the relevant standards, including EN 1991-1-4 Eurocode 1: Actions on structures: general actions - Wind actions, EN 1991-1-5:2003 Eurocode 1 – Actions on structures: General actions – Thermal actions, and EN 1991-1-3:2003 Eurocode 1 – Actions on structures: General actions – Snow Loads.	• Population • Human Health	No
Extreme weather (Gale force winds / storms / tornado / cyclone / hurricane / typhoon) event	Yes	The Proposed Development does not have the potential to cause such an event. Flooding along the extents of the Proposed Development which may occur in extreme wind events, is reviewed separately. Although there are gale force winds in Ireland, their destructive force tends to be much less than in other parts of the world. There is a risk of structural damage to various elements of the Proposed Development from extreme wind events, particularly to the OHLE equipment.	• Population • Human Health	**Yes**

Hazard Type	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Progress to Stage 3?
Droughts	No	The Proposed Development is not especially vulnerable to negative impacts as a result of water supply shortages / restrictions, nor is it likely to exacerbate such an event.	N/A	No
Lightning Strikes	Yes	The Proposed Development does not have the potential to cause such an event. The OHLE equipment along the extents of the Proposed Development have the potential to be vulnerable to lighting strikes.	• Human health	**Yes**
Heat Waves	No	The detailed design of the Proposed Development will be in accordance with the relevant codes and standards, including EN 1991-1-5:2003 Eurocode 1 – Actions on structures - General actions – Thermal Actions. The Proposed Development design will consider the effect of high temperatures; however, the Proposed Development will be no more vulnerable than any other development or is it likely to exacerbate such an event.	N/A	No
Wildfires	No	The Proposed Development does not have the potential to cause such an event. There is no vegetation in the vicinity of the Proposed Development boundary which could support a wildfire.	N/A	No
Air Quality Events	Yes	The Proposed Development consists of electrification of c.37km of railway line contributing to the reduction of rail infrastructure related air pollution. It is not considered necessary to undertake any more assessment than is already proposed for the air quality assessment in Chapter 12 (Air Quality) in Volume 2 of this EIAR.	• Population • Human Health • Biodiversity • Water	No
Extreme cold weather	Yes	The Proposed Development does not have the potential to cause such an event. The design of the Proposed Development is in accordance with the relevant codes and standards, including EN 1991-1-5 Eurocode 1 – Actions on structures: General actions – Thermal Actions. and EN 1991-1-3:2003 Eurocode 1 – Actions on structures: General actions – Snow Loads.	N/A	No

Hazard Type	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Progress to Stage 3?
Space Disasters				
Impact events and airburst	No	The Proposed Development is no more vulnerable to impact events and airburst than any other development.	N/A	No
Solar flare	No	The Proposed Development is no more vulnerable to solar flare than any other development.	N/A	No
Industrial Accidents				
Accidents at Seveso Sites	Yes	The Proposed Development is in the vicinity of one Seveso site in proximity to the existing railway line (Refer to Section 24.4). Works will be confined to the existing railway corridor and supporting Construction Compounds and are not likely to cause damage to the Seveso site in an event of an accident. However, an explosion / fire from the Seveso site can present a risk to the development and construction workers. There is considered to be low risk to the Proposed Development from accidents/disasters caused by nearby COMAH Establishments (Seveso Sites) due to the safety, health and management systems and procedures in place as required under the COMAH Regulations. In the event of an accident, the Seveso site will have an emergency response plan registered with the HAS.	• Population • Human Health • Material Assets Non-Agriculture	**Yes**
Crime/Civil Unrest				
Crime or Civil Unrest	No	The Proposed Development is no more vulnerable than any other developments.	N/A	No

Hazard Type	Relevant for long list?	Why? (note if risk to the project, or project exacerbates risk)	Potential Receptors	Progress to Stage 3?
Cyber attacks	Yes	The Proposed Development is no more vulnerable than any other developments.	N/A	No
Terrorism	Yes	The Proposed Development is no more vulnerable than any other developments.	N/A	No
Security Incidents on Trains	Yes	Incidents of anti-social behaviour can occur on public transport, including the rail network. With the frequency of trains increasing as part of the Proposed Development, there is an increased risk of security incidents.	N/A	**Yes**
Disease				
Human disease	Yes	Public transport services can present a risk of spread of disease between passengers and or members of staff due to the close proximity of people to each other. The Proposed Development will enhance the existing rail network and will not exacerbate the risk of human disease.	• Population • Human health	No
Animal and Plant Disease	Yes	There will be no risk of spread of invasive species during the operation phase of Proposed Development. If a staff member identifies an invasive alien species along the railway line, measures outlined in existing Iarnród Éireann guidelines and procedures will be adhered to.	• Human Health • Biodiversity • Material Assets Non-Agricultural • Material Assets Agricultural	No

24.5.3 Stage 3 – Assessment

The screened in hazard classes from Stage 2 are brought forward to Stage 3 for further detailed assessment as shown in Table 24-7. The assessment is focused on risk events that have a low likelihood to occur but that have high consequence on environment, human health, infrastructure and/or cultural heritage.

The hazards are assessed based on their likelihood and impact and resulting level of significance, and scored and ranked as Low, Medium or High. The outcome of this assessment will highlight if hazards have been managed to an acceptable level, to as low as reasonably practicable (ALARP). Where hazards do not provide sufficient mitigation by embedded mitigation (mitigation by design), these hazards are taken forward and assessed in more detail, with additional "secondary mitigation" as shown Table 24-8.

Table 24-7 Assessment of Remaining Risks Associated with Proposed Development

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
C1	Major Road Traffic Accidents	• Increased number of Heavy Goods Vehicles (HGVs) along haulage routes and construction site access points. • Works on or near existing road network. • Traffic diversions affected routes (where required) • Materials such as structures, unsecure large objects and debris falling from HGVs onto the roads.	Major road traffic accident which can result in: • Death / injury to workforce and/or the public. • Delays and congestion along the road network. • Multiple vehicle collisions (from unexpected fallen construction objects from HGVs or general increase of HGVs along the network). • Property damage.	• HGVs will transport materials and waste along designated haulage routes suitable for such vehicles as outlined in Chapter 5 (Construction Strategy) in Volume 2 of this EIAR.	4 – Likely	3 – Significant	12 - Medium	**Yes** – to achieve ALARP
C2	Train derailment	• Works on and/or adjacent to a live rail line. • Falling objects onto the train / rail track from	Train accident / derailment which can result in: • Death / injury to a member of the public.	• Scheduling of works outside of operational times of rail services and freights i.e., night time works as identified in Chapter 5	2 – V. Unlikely	3 – Significant	6 – Low	No – mitigation by design achieves ALARP.

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
		construction works.	• Delays and congestion along the rail network. • Property damage.	(Construction Strategy). • Complete possession of rail line when works at, or near the rail line, need to be carried out as outlined in Chapter 5 (Construction Strategy). • There are strict safety restrictions related to working on or adjacent to a live railway line.				
C3	Accidents when working with electrical equipment and / or in vicinity of rail line	• Installation of OHLE equipment. • Working at or near live railway line (diesel powered or electrical). • Installation of electrical equipment for buildings	Accidents leading to injury and in severe cases, death when handling electrical equipment can lead to injury or death.	• Appropriate training will be provided for installing OHLE equipment. • Implementation of measures set out in IÉ standards and guidelines for working on or in vicinity of rail line which include, but not limited to, the following: ○ IÉ I-DEP-0120 Guidance on Third Party Works	3 – Unlikely	2 – Moderate	6 – Low	No – mitigation by design achieves ALARP.

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
				○ IÉ I-DEP-0121 Third Party Works: Additional Details of Railway Safety Requirements ○ IÉ Rule Book Section Z Electrified Lines. • Implementation of measures set out in codes and standards for installation of electrical equipment: ○ EN 61140 Protection against electric shock - Common aspects for installation and equipment. ○ I.S. 10101:2020 National Rules for Electrical Installations ○ EN 60364 Electrical installations for buildings.				

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
				○ BS 7671 Requirements for electrical installations. IET Wiring Regulations				
C4	Impact on Critical Infrastructure	• Impact on overground and underground utilities.	• Damage to electrical utilities (overground and underground) resulting in power outage, risk of electrocution which can lead to serious injury or death. • Damage to gas mains which can result in supply outage, risk of explosion or gas inhalation which can lead to serious injury or death. • Damage to water piping can lead to supply outage, flooding of construction sites and property damage to nearby	• All utility services near the Proposed Development have been identified and locations where the proposed alignment crosses existing infrastructure have been identified. • Consultations have been undertaken with all known service providers and their requirements have been identified and incorporated into the design. • Where there is interaction between the Proposed Development and existing infrastructure, the locations of the interactions have been	3 – Unlikely	2 – Moderate	6 - Low	No – mitigation by design achieves ALARP.

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
			buildings. • Damage to foul piping can lead to contamination of construction site, risk of water and soil pollution and other associated environmental impacts.	identified and planned for, and therefore the potential for any service disruption is limited. • In bridge deck reconstructions, where interactions are located, these utilities will undergo decommissioning, followed by replacement of pipes, and later diverted appropriately. • Any utilities to be diverted will comply to guidelines below: ○ Irish Water Code of Practice for Water Infrastructure. ○ Irish Water Code of Practice for Wastewater Infrastructure. ○ Gas Network Ireland Code of Practice.				

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
				○ ESB Code of Practice				
C5	Collapse / Damage to structures	• Works to existing structures such as the railway bridges will be required. • Vibratory works in vicinity of sensitive structures, such as buildings of architectural significance. • Demolitions of existing buildings, structures and bridges is an activity with structural collapse risk.	• Risk of proposed building or structure, infrastructure collapsing, resulting in injury or death to workers and the general public. • Collapse/ Damage to protected structures. • Damage to adjacent occupied buildings resulting in injury or death to the general public	Compliance with design standards that include, but are 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. Compliance with material standards to include, but are 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.	2 – V. Unlikely	4 – V. Significant	8 – Medium	Yes - to achieve ALARP

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
				• 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.				
C6	Ground Collapse	• Deep excavations for construction may lead to fluctuations to the groundwater table resulting in settlement collapse of soil in the construction site.	• Collapse of the proposed structure during construction resulting in property damage and injury or death to workers.	• Geophysical surveys will be carried out at detailed design stage and prior to construction works. • Construction methods carried out in accordance with appropriate regulations. Slopes cutting back the excavation/trench at an angle inclined away from the excavation or shoring protections,	3 – Unlikely	4 – V. Significant	12 – Medium	Yes - to achieve ALARP.

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
				excavations and trenches. Daily inspection, keep excavation material and equipment away from trench edges.				
C7	Release of asbestos	• Demolition of bridge structures which may be contaminated with asbestos.	• Exposure of workers to asbestos containing materials. • In extreme cases, an uncontrolled release of asbestos containing materials and the subsequent exposure of the material to the general public.	• Prior to any works, demolition surveys will be carried out to identify any asbestos containing materials (ACM). • In buildings where traces of asbestos have been found, a remedial strategy will be developed prior to any construction and demolition works.	3 –Unlikely	2 – Moderate	6 – Low	No – mitigation by design achieves ALARP.
C8	Fire / Explosion	• The Proposed Development will require the use of flammable substances such as fuel stored at construction compounds.	• Death or injury to workers when handling flammable materials, carrying out hot work.	• All construction compounds and construction sites will have appropriate fencing, as well as secure access and checks in place for vehicles and personnel arriving.	2 – V. Unlikely	5 – Profound	10 - Medium	Yes - to achieve ALARP.

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
		• Presence of gas pipelines within the works (as discussed under C6). • Electrical accidents (as discussed under C5). • Construction works requiring hot work e.g., cutting, welding, soldering.	• Fire/ explosion at construction site leading to damage or collapse to proposed structures and/ or nearby property affecting members of the public. • Theft of explosive/ flammable material.					
C9	Works near surface or groundwater	• Unknown groundwater level or regime. • An uncontrolled release of silty sediment during construction. • Excavations and below ground utilities during construction could be vulnerable to groundwater	• Death or injury to workers and/ or the general public. • Release of large quantities of water within construction site.	• Site water management at all earthworks sites will be implemented to prevent waterlogging of freshly excavated soil, prevent silty runoff from entering watercourses and drainage systems, and to alleviate rutting of haul routes.	3 –Unlikely	2 – Moderate	6 – Low	No – mitigation by design achieves ALARP.

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
		inundation and flooding.						
C10	Industrial Accidents (works near Seveso site)	• Risk of occurrence of fire / explosion or pollution event in a nearby Seveso site (Flogas Ireland Limited, Drogheda)	• Injury or death of construction workers • Infrastructural damage to the Seveso site and the Proposed Development. • Environmental contamination.	• There are no mitigation by design measures that can reduce the risk of an accident at a Seveso site.	2 – V. Unlikely	4 – V. Significant	8 – Medium	Yes - to achieve ALARP.
C11	Extreme Weather (Flooding) Events	• Weather events leading to flooding such as heavy/ prolonged rainfall/ tidal event. • Prolonged heavy rain / flooding directly over construction sites. • Prolonged heavy rain resulting in breach of embankments in nearby waterbodies.	Extreme flood events can lead to: • Hazardous working conditions for workers. • Flooding on construction sites, specifically within high flood risk areas. • Breach of embankments on nearby waterbodies.	• A Flood Risk Assessment has been completed for the Proposed Development. Refer to the Flood Risk Assessment Report (Appendix A.10). • Construction works in areas prone to flooding are to take place during dry seasons (and are avoided where possible). • The Contractor must follow the weather	4 - Likely	3 – Significant	12 – Medium	Yes - to achieve ALARP

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
		• Extreme/ prolonged rainfall events causing sediment runoff during construction. • Extreme/ prolonged rainfall events over open or deep excavations	• Damage of construction materials, collapse of temporary and permanent structures. • Sediment runoff / release of contaminants into watercourses from construction sites, specifically those within high flood risk areas.	forecast prior to commencing instream works and concrete pouring. • This is particularly relevant at stream crossings and on Estuary Road where tidal flooding is at high risk; • The appointed contractor will prepare a Surface Water Management Plan (SWMP) as part of the Construction Environmental Plan (CEMP) which will outline appropriate mitigation measures for the Construction Stage. An emergency response plan may be drawn up including appropriate response measures for such Extreme Weather (Flooding) situations.				

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
C12	Groundwater Contamination	• Ground disturbance activities which has the potential to accidentally damage / contaminate unknown water abstraction points such as boreholes, wells and aquifers. • Contamination of surface water	• Contamination of public drinking water supply.	• Groundwater levels have been determined from recent ground investigation works carried out along the extents of the Proposed Development. • Further ground investigation surveys will be undertaken during detailed design stage prior to construction. • Measures will be implemented (e.g., identifying suitable areas for batching activities and storage of potential pollutants, and good housekeeping practices) to minimise the risk of spills and contamination of soils and waters.	2- Ext. Unlikely	3 - Significant	6 - Low	No – mitigation by design achieves ALARP.

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
				• Sediment control methods are outlined in the Surface Water Management Plan in Appendix A5.1: (CEMP), and these will be implemented by the appointed contractor.				
C13	Spillage or long-term seepage of pollutants into a watercourse	• Works near and over watercourses. • Accidental pollution/ long-term seepage of pollutants from construction materials into watercourses during construction.	• Impacting the water quality status of watercourses from accidental pollution event/ sediment runoff from construction sites into the waterbody. • Pollution event on downstream European sites. • Pollution to surface water which connects with groundwater, potentially affecting drinking water supply	• There are no mitigation by design measures that can completely prevent the risk of accidental spillage or long-term seepage of pollutants into a watercourse during construction. However, it is not considered likely that significant volumes to cause significant effects would be on construction sites close to water bodies. • Surface water control measures will be implemented to ensure that silt laden or contaminated surface	3 – Unlikely	3 – Unlikely	9 – Medium	Yes – to achieve ALARP

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
				water run-off from construction compounds does not discharge directly to surface waters.				
C14	Animal and Plant Disease	• Presence of invasive species at construction sites and compounds.	• Spread of invasive species during construction works.	• Ecological surveys consisting of invasive species surveys, and protected species surveys may be undertaken prior to construction to establish whether any are present within the footprint of the proposed works. • An Invasive Species Management Plan (ISMP) for the control of invasive species on the Proposed Development is within the CEMP in Volume 4 of this EIAR.	3 – Unlikely	3 – Significant	9 – Medium	Yes – to achieve ALARP
C15	Human Disease	• Construction workers working on construction sites for the project.	• Spread of disease amongst workers on site and in worst case, to members of the community.	• There are no mitigation measures by design to alleviate / eliminate the risk of human disease.	3 – Unlikely	2 – Moderate	6 – Low	No – mitigation by design achieves ALARP

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
			• Weils disease may be contracted at any location. • Shortage of workers on construction sites due to illness can impact the construction programme.					
O1	Major Road Traffic Accidents	Proposed modifications to road network bridge reconstructions.	• Severe congestion and delays caused by changes to the road network. • Major traffic accidents resulting in injury or death. • Spillage of contaminants such as fuels in an event of a traffic accident.	• Closure of the user worked level crossing XB001 removes the interface between agricultural vehicles and rail traffic and may improve safety for all users. • The transport routes have been designed in accordance with a range of codes and standards applicable to road design published by TII and the NTA.	2 – Likely	2 – Moderate	4 - Low	No – mitigation by design achieves ALARP.

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
				These include the Design Manual for Urban Roads and Streets (DMURS) along with standards relating to cycleways and technical standards relating to roads, lighting, drainage and safety.				
O2	Rail accidents / Train derailment	• Power outage affecting the electrical rail fleet. • Electromagnetic interference. • Failure of electrical infrastructure (e.g., failure of signalling, track crossovers, communication). • Collapse of new structures onto the rail track.	Major rail derailment accident may lead to: • Injury or death of staff and rail passengers. • Damage to nearby properties and / or injury to the general public. • Impact to existing and proposed road network causing a major traffic accident.	• New rail tracks have been designed to the Iarnród Éireann and European standards providing for derailment protection and containment where required. • The Proposed Development will be designed to withstand extreme weather events such as wind, rainfall, flooding, temperature etc.) including climate	2 – V. Unlikely	5 - Profound	10 – Medium	Yes - to achieve ALARP.

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
		• Obstruction along the railway line. • Vehicles striking rail structures such as bridges.	• Disruption to rail transportation network. • Spillage of contaminants such as fuels in an event of derailment causing a traffic accident.	change allowances. • All equipment that has Electromagnetic Compatibility (EMC) and Electromagnetic Interference (EMI) to be used will be in accordance with EU standards.				
O3	Electrical Accidents	• Members of public encountering OHLE equipment. • Members of staff working with electrical equipment.	• General public coming into contact within OHLE equipment resulting in injury.	Electrical safety of the OHLE and protection against electric shock will be achieved by complying with: • EN 50122-1 as set out in ENE-TSI Section 4.2.18 'Protective provisions against electric shock' • I-ETR-4004 'Electrification clearances'. • Operation of Electrical Installations • IEC 62236 • Railway applications - Electromagnetic	3 – Unlikely	2 – Moderate	6 - Low	No – mitigation by design achieves ALARP.

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
				compatibility • S.I. 299/2007 Statutory Instrument Safety, Health and Welfare at Work (General Application) Regulations 2007. The required safety standards will be achieved through installation of safety screens and extending / modifying the existing fencing where applicable along the rail corridor to eliminate the risk of OHLE coming into contact with members of the public.				
O4	Bridge Failure	• Bridge strike by train or road traffic. • Inadequate / poor design of bridge structure(s). • Poor quality of materials used for construction. • New bridge structures	Death or injury to staff and / or members of the public.	All structures have been designed to be fully compliant with: • IÉ's CCE-TMS-410 Civil Engineering Structures Design Standard. • Eurocode I.S. EN 1990 Basis of structural design.	2 – V. Unlikely	3 – Significant	6 – Low	No – mitigation by design achieves ALARP.

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
		proposed as part of the development.		• Eurocode I.S. EN 1991-2 Actions on structures – Part 2: Traffic loads on bridges (Including Irish National Annex). • Eurocode I.S. EN 1991-1-7 Actions on structures – Part 1-7: General actions Accidental actions (Including Irish National Annex). • I.S. EN 1992-2 Design of concrete structures – Concrete bridges – Design and detailing rules (Including Irish National Annex). • EN 1990 Eurocode - Basis of structural design. • EN 1993 Eurocode 3. Design of steel structures. • EN 1993-1 Design of steel structures.				

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
				General rules and rules for buildings. Degree of impact protection. Compliance with material standards to include, but are 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.				
O5	Tunnel Failure / Fire	• Operation of underpass (e.g., Dublin Road	• In event of an underpass collapse, there is a risk of death or injury to	The design and modification of existing underpasses (e.g., Dublin Road underbridge, UBK1) complies with the IÉ / TII	1 Ext. Unlikely	4 – V. Significant	4 – Low	No – mitigation by design

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
		underbridge, UBK01)	staff and / or members of the public. • There is a risk of train derailment in the event of collapse of an underpass.	DMRB codes of practice and guidance documents and other standards to include: • Eurocode I.S. EN 1990 Basis of Structural Design. • I.S. EN 1992-2 Design of concrete structures – Concrete bridges – Design and detailing rules (Including Irish National Annex). • Eurocode I.S. EN 1991-1-7 Actions on structures – Part 1-7: General actions Accidental actions (Including Irish National Annex). • IÉ's CCE-TMS-410 Civil Engineering Structures Design Standard. • TII's DMRB DN-REQ-03034 The Design of Road Restraint Systems (Vehicle and Pedestrian) for Roads and Bridges.				achieves ALARP.

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
				The above list is non-exhaustive.				
O6	Building Failure / Fire	• Operation of the proposed substations.	• In event of building collapse or fire, there is a risk of death or injury to staff and / or members of the public.	• The design of the buildings (e.g. depots/substations) adheres to project standards related to permanent way and civil engineering. • In addition, standards relating to building regulations, and national Technical Guidance Documents including those applicable to footpaths and cycleways published by TII and the NTA, and also other international guidelines concerning accessibility and fire safety.	2 – V. Unlikely	4 – V. Significant	8 – Medium	**Yes** - to achieve ALARP.
Operational Phase								
O7	Power Failure	• Extreme weather events.	Power failure may lead to: • Failure of electrical infrastructure (e.g.,	The installation of electrical components within structures complies with guidelines /	3 – Unlikely	2 – Moderate	6 - Low	No – mitigation by design

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
		• Mishandling of electrical equipment. • Electromagnetic interference.	failure of signalling, track crossovers, communications). • Disruption to rail transportation network. • Power outage within new structures such as the Spencer Dock Station and the depot	standards that include, but are not limited to the following: • EN 60364 Electrical installations for buildings • BS 7671 Requirements for electrical installations. IET Wiring Regulations				achieves ALARP.
O8	Safety Protection for members of the public and users of structures (risk of falling)	• Reconstruction of existing bridge structures over the railway line. • Presence of OHLE along the extents of the development. • Electric shock.	• Risk of injury or death to the members of the public	• The existing bridges along the route must comply with necessary safety requirements. • The requirement is that the parapets over the newly electrified rail lines should be minimum 1.8m in height and have measures in place to prevent climbing or walking across the top of the parapets.	1 - Ext. Unlikely	5 – Profound	5 – Low	No – mitigation by design achieves ALARP.

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
				• The bridge replacements will require new parapets which meet current containment standards (H4a containment) for bridges crossing railways, where applicable. (Refer to Chapter 4 Description of Proposed Development). • Several existing bridges require parapet modification works to ensure that there is an adequate containment barrier to the OHLE from road level (refer to Chapter 4 Project Description). • Fencing along the railway line will be developed in accordance with Iarnród Éireann CCE-				

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
				TRK-SPN-037 Fencing.				
O9	Extreme weather (flood) events	• Extreme flooding causing breach of embankments of watercourses. • Extreme or prolonged rainfall events flooding the railway line. • New structures such as the substations affecting the flood patterns in the area.	• Construction of associated infrastructure such as substations on susceptible lands may affect flood patterns in the area causing more intense flooding on surrounding lands. • Flooding along the railway line which may temporarily suspend services.	• New infrastructure has been designed to include allowances for climate change. • Drainage design includes allowances for climate change. • A Flood Risk Assessment (Stage 2) has been completed for the Project. Refer to the Flood Risk Assessment Report (Appendix A10.1 in Volume 4 of this EIAR).	3 – Unlikely	3 – Significant	9 –Medium	Yes - to achieve ALARP.
O10	Extreme weather (Gale force winds / storms / tornado / cyclone / hurricane / typhoon) event	• Extreme weather events such as storms / gale force winds within the area of Proposed Development.	• Damage to rail infrastructure e.g., OHLE equipment. • Obstruction of rail line due to fallen objects e.g., trees.	• The detailed design of the Proposed Development will be in accordance with all relevant codes and standards, including IS EN 1991-1-4:2005 Eurocode 1: Actions on structures – general actions - Wind actions.	3 – Unlikely	2 – Moderate	6 - Low	No – mitigation by design achieves ALARP.

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
				• Iarnród Éireann has a management protocol for preparedness and response to extreme weather events such as CCE-TMS-311 Iarnród Éireann Weather Management Procedures. This protocol includes assessing the operability of the network for services and co-operating and communicating with emergency services and national stakeholders, to ensure passengers are accommodated insofar as is practical and safe. In addition, Iarnród Éireann have a management protocol to facilitate passenger services being brought back into operation as quickly and safely as				

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
				possible after an extreme weather event.				
O11	Lightning strikes	• The Proposed Development does not have the potential to cause such an event. • OHLE equipment along the extents of the Proposed Development has the potential to be vulnerable to lighting strikes.	In event of lightning strikes, there is a risk of: • Power outage which may cause signal failures along the line which are electrically powered. • suspension of rail services. • Risk of injury to staff and rail passengers.	• To protect the DART+ Coastal North OHLE equipment against atmospheric overvoltage protection, lightning and switching overvoltages, surge arresters will be installed. • The design will be based on the methods contained in IEC 62305 'Protection Against Lightning, Part 2, Risk Management'. • In addition, the low voltage elements within DART+ Coastal North will comply with I.S. 10101 Part 443 'Protection against transient overvoltages of atmospheric origin or due to switching'.	2 – V. Unlikely	2 – Moderate	4 - Low	No – mitigation by design achieves ALARP.

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
				• In relation to buildings, measures included in BS EN 62305 Protection against lightning and BS 7430 Code of practice for protective earthing of electrical installations will be complied with.				
O12	Accident at Seveso Sites.	• Fire/ explosion and/ or equipment failure the nearby, Seveso industrial site.	• Damage to the railway line. • Risk of injury or death and environmental impact.	• There are no mitigation by design measures that can reduce the risk of an accident at a Seveso site.	2 – V. Unlikely	4 – V. Significant	8 – Medium	Yes - to achieve ALARP
O13	Security Incidents on Trains	• Anti-social behaviour on trains.	• Verbal or physical conflicts from passenger(s) directed at other passengers or members of staff.	• Existing measures devised by Iarnród Éireann will be implemented such as a security strategy which incorporates the proactive support of IÉ's security contractor and An Garda Síochána.	4 - Likely	1 - Slight	4 – Low	No – mitigation by design achieves ALARP

No	Hazard Type	Source and / or pathway receptor linkage	Reasonable worst consequence if event did occur	Mitigation by design	Risk Evaluation		Level of Significance	Secondary mitigation required?
					Likelihood	Potential Impact		
				• The Iarnród Éireann's Text SMS Service 2 which is currently operational on the DART network will be maintained to allow all customers to discreetly report incidents of antisocial behaviour at any time including while on board a train while the incident is occurring.				

Table 24-8 Assessment of Major Accidents and Disasters with secondary mitigation measures in place

No	Hazard Type	Receptors	Secondary mitigation	Post Mitigation Likelihood	Post Mitigation Potential Impact	Level of Significance (Residual Effect)
Construction Phase						
C1	Major Road Traffic Accidents	• Human Health • Biodiversity • Hydrology • Population • Material Assets Non-Agricultural.	• A Construction Traffic Management Plan (CTMP) has been prepared and will be further developed in consultation with Iarnród Éireann and the respective local authority prior to the commencement of the Construction Phase and implemented during the Construction Phase. • A Mobility Management Plan has been included and will be further developed as part of the CTMP and will address all modes of transport and travel required to deliver the project during the Construction Phase. This will include details regarding construction workers travelling to site, car-parking, haulage routes and construction compounds to reduce potential effects (incl. traffic accidents) caused due to construction traffic and residential neighbourhoods. • All accesses to the worksite and the compounds will be signposted, and anyone outside the work will be prohibited, installing the necessary perimeter fences and the necessary warning signs. • The necessary traffic signs will be placed outside the work to warn pedestrian and vehicle traffic of the risks involved in the work. Similarly, the necessary protections and notices will be placed, in specific cases in which the circulation through the annexed streets is affected. • All HGV drivers will be provided with appropriate safety awareness training.	2 – Unlikely	2– Moderate	4 - Low

No	Hazard Type	Receptors	Secondary mitigation	Post Mitigation Likelihood	Post Mitigation Potential Impact	Level of Significance (Residual Effect)
C5	Collapse / Damage to structures	• Human Health • Material Assets Non-Agricultural • Architectural Heritage	• Stakeholder consultations with owners of sensitive structures / buildings. • Monitoring of existing historic / sensitive structures during construction to ensure their stability and durability. • Where appropriate, sensitive structures at risk from construction works will be protected. • A CEMP and an Incident Response Plan (IRP) have been prepared and will be further developed and implemented during construction so as to manage the risk of collapse / damage to structures. • Mitigation measures in relation to vibration identified in EIAR Chapter 14 (Noise & Vibration) will be adhered to.	2 – V. Unlikely	3 – Significant	6 – Low
C6	Ground Collapse	• Human Health • Material Assets Non-Agricultural	• A CEMP and an Incident Response Plan (IRP) have been prepared and will be further developed and implemented during construction, so as to manage the risk of collapse/ damage to structures.	1 – Ext. Unlikely	4 – V. Significant	4 – Low
C8	Fire / explosion	• Human Health • Population • Material Assets Non-Agricultural • Architectural Heritage	• The risk is managed through the CEMP and IRP. • Hot Work Permit procedure will be followed. • All construction compounds and construction sites will have 24/7 security. • Explosive materials will not be stored on construction site /compounds overnight. • Transportation of explosives will be subject to prior agreement.	2 – V. Unlikely	3 – Significant	6 – Low

No	Hazard Type	Receptors	Secondary mitigation	Post Mitigation Likelihood	Post Mitigation Potential Impact	Level of Significance (Residual Effect)
			When transportation of these materials is required, appropriate security measures will be implemented such as escort by An Garda Síochána			
C10	Industrial Accidents (works near Seveso site)	• Human Health • Population • Material Assets Non-Agricultural	• The Proposed Development cannot provide offsite mitigation measures however, TII's protocols for the management of major accidents will be followed in an event there is an incident at a nearby Seveso sites. • In the event of an accident, the Seveso site will have an emergency response plan registered with the HAS which will be activated and implemented.	2 – V. Unlikely	3 – Significant	6 – Low
C11	Extreme Weather (Flooding) Events	• Biodiversity, • Material assets agricultural • Material Assets Non-Agricultural • Population • Human Health • Water • Hydrogeology	• As is normal practice with infrastructure projects a Construction Environmental Management Plan (CEMP) has been prepared for the Proposed Development. This will be further developed prior to construction and will be fully implemented during the Construction Phase. • Monitoring of weather forecasts to ensure that necessary actions will be implemented in time at construction sites prior to prolonged / extreme weather events. • An emergency response plan may be drawn up including appropriate response measures for such Extreme Weather (Flooding) situations.	3 – V. Unlikely	2– Significant	6 – Low
C13	Spillage or long-term seepage of pollutants into a watercourse	• Population • Human Health • Water • Hydrogeology	• As is normal practice with infrastructure projects, a CEMP has been prepared for the Proposed Development. This will be further developed prior to construction and will be fully implemented during the Construction Phase.	3 – V. Unlikely	2– Significant	6 - Low

No	Hazard Type	Receptors	Secondary mitigation	Post Mitigation Likelihood	Post Mitigation Potential Impact	Level of Significance (Residual Effect)
		• Biodiversity	An Incident Response Plan is included as part of the CEMP detailing the procedures to be undertaken in the event of spillage of chemical, fuel or other hazardous wastes, non-compliance with any permit or license, or other such risks that could lead to a pollution incident, including flood risks. • The Environmental Manager will prepare Method Statements for construction works as detailed in the CEMP to be undertaken on, over or near water in consultation with Inland Fisheries Ireland (IFI) and other relevant authorities as necessary. • Mitigation measures identified in Chapter 8 (Biodiversity), Chapter 10 (Water), and Chapter 11 (Hydrogeology) in Volume 2 of this EIAR will be fully implemented. • During construction, cognisance will have to be taken of the following guidance documents for construction work on, over or near water: ○ Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites (Eastern Regional Fisheries Board). ○ Central Fisheries Board Channels and Challenges – The enhancement of Salmonid Rivers. ○ CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors. ○ CIRIA C648 Control of Water Pollution from Constructional Sites. • Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (TII, 2006).			

No	Hazard Type	Receptors	Secondary mitigation	Post Mitigation Likelihood	Post Mitigation Potential Impact	Level of Significance (Residual Effect)
C15	Human Disease	• Human Health. • Population	• The contractor will provide site operatives with appropriate first aid material. All site operatives will be advised to wear steel toe cap boots with trousers to be tucked inside along with appropriate PPE such as gloves and headwear. All site operatives should be advised of the importance of washing hands before eating to avoid the risk of contracting Weils disease and other water borne diseases. • Government and HSE health and safety guidelines will be adhered to in relation to Covid-19 in workplaces to reduce the spread of the virus amongst the construction workers.	2 – V. Unlikely	3 - Significant	6 - Low
Operational Phase						
O2	Train Derailment	• Human Health. • Population. • Architectural Heritage. • Material Assets Non-Agricultural.	• Appropriate training will be provided to all relevant staff members for operation of the electrified train fleet. • All relevant staff members shall familiarise themselves with Section Z Electrified Lines of the IÉ Rule Book prior to operating the fleet. • Operation and maintenance manuals will be made available to staff as early as possible. • A dedicated Major Incident Response Plan has been developed by Iarnród Éireann for the DART+ Coastal North project to identify the appropriate emergency response plans in event of an incident. • Appropriate back up procedures will be prepared and implemented in an event of an incident. • Periodic inspections and maintenance (as required) of the rail line in accordance with Iarnród Éireann (IÉ) Standards which include, but not limited to, the following:	1 – Ext. Unlikely	5 - Profound	5 - Low

No	Hazard Type	Receptors	Secondary mitigation	Post Mitigation Likelihood	Post Mitigation Potential Impact	Level of Significance (Residual Effect)
			○ IÉ CCE-TMS-363 Requirements for the Rail Testing Vehicle. ○ IÉ CCE-TMS-360 Track and Structures Inspection Requirements. ○ IÉ CCE-TMS-320 Track Quality Standard. ○ International Union of Railways (UIC) Code 712 R Rail Defects • Design measures for the DART+ Coastal North project have been accepted by the Commission for Railway Regulation (CRR) in order for licence to be granted.			
O6	Building Failure / Fire	• Human Health. • Population	• Fire Safety Strategies outlining measure to be implemented in the event of a fire will be prepared for the proposed substations and be submitted for approval to the relevant authorities.	2 – V. Unlikely	3 – Significant	6 - Low
O9	Extreme weather (flood) events	• Biodiversity • Material assets agricultural • Material Assets Non-Agricultural • Population • Human Health • Water • Hydrogeology	• Ongoing consultation and cooperation with local authorities and the Office of Public Works (OPW). • Inspections and maintenance (as applicable) of the drainage system and the compensatory storage areas. • A dedicated Major Incident Response Plan has been developed by Iarnród Éireann for the DART+ Coastal North project to identify the appropriate emergency response plans in event of flooding.	2 – V. Unlikely	3 - Significant	6 - Low

No	Hazard Type	Receptors	Secondary mitigation	Post Mitigation Likelihood	Post Mitigation Potential Impact	Level of Significance (Residual Effect)
O12	Industrial Accidents – Seveso sites	• Human Health. • Population. • Material Assets Non-Agriculture	• The Proposed Development cannot provide offsite mitigation measures however, TII's protocols for the management of major accidents will be followed in an event there is an incident at a nearby Seveso site. • In the event of an accident, the Seveso site will have an emergency response plan registered with the HAS which will be activated and implemented.	2 – V. Unlikely	3 - Significant	6 - Low

24.6 Residual Effects

Significant residual effects are not likely to occur during Construction or Operational Phases of the Proposed Development as there are no identified risk events that would present a sufficient in-combination likelihood of risk and consequence that would lead to a major accident or a disaster.

24.7 Cumulative Effects

The cumulative assessment of relevant plans and projects is undertaken separately in Chapter 26 (Cumulative Effects) in Volume 2 of this EIAR.

24.8 References

Commission for Railway Regulation (2020). Railway Safety Performance in Ireland 2020

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