



Chapter 20

Risk of Major Accidents and / or Disasters

Contents

20. Risk of Major Accidents and / or Disasters	1
20.1 Introduction	1
20.2 Risk of Major Accidents and / or Disasters.....	1
20.2.1 Definitions.....	2
20.3 Methodology	3
20.3.1 Scope and Context	3
20.3.2 Legislation, Guidelines and Reference Material.....	3
20.3.3 Risk Assessment Methodology	4
20.4 Potential Impacts	7
20.4.1 'Do Nothing' Scenario.....	7
20.4.2 Risk Evaluation	7
20.4.3 Seveso Sites.....	13
20.5 Mitigation and Monitoring Measures	13
20.5.1 Inherent Design	13
20.5.2 Plans and Procedures	14
20.6 Residual Impacts	17
20.7 References	18

20. Risk of Major Accidents and / or Disasters

20.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) assesses the potential significant impacts of the Belfield / Blackrock to City Centre Core Bus Corridor Scheme (hereafter referred to as the Proposed Scheme) on the environment, deriving from its vulnerability to risks of major accidents and / or disasters during the Construction Phase and Operational Phase.

The aim of the Proposed Scheme when in operation is to provide enhanced walking, cycling and bus infrastructure on this key access corridor in the Dublin region, which will enable and deliver efficient, safe, and integrated sustainable transport movement along the corridor. The objectives of the Proposed Scheme are described in Chapter 1 (Introduction). The Proposed Scheme which is described in Chapter 4 (Proposed Scheme Description) has been designed to meet these objectives.

The design of the Proposed Scheme has evolved through comprehensive design iteration, with particular emphasis on minimising the potential for environmental impacts, where practicable, whilst ensuring the objectives of the Proposed Scheme are attained. In addition, feedback received from the comprehensive consultation programme undertaken throughout the option selection and design development process have been incorporated, where appropriate.

20.2 Risk of Major Accidents and / or Disasters

Article 3 of Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (hereafter referred to as the Environmental Impact Assessment (EIA) Directive) requires for the assessment of expected effects of major accidents and / or disasters within environmental impact assessment (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, Annex IV of the EIA Directive states that the 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 Environmental Protection Agency (EPA) Revised Guidelines on the Information to be Contained in Environmental Impact Statements (EPA 2015a) refer to 'Accidents', recommending that:

'Aspects of the proposal that could cause accidents with a likelihood of creating significant environmental impacts should be considered'.

The Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines) (EPA 2017) elaborate on risk assessment further under Section 3.7.3:

'To address unforeseen or unplanned effects the Directive further requires that the EIAR takes account of the vulnerability of the project to risk of major accidents and / or disasters relevant to the project concerned and that the EIAR therefore explicitly addresses this issue. The extent to which the effects

of major accidents and / or disasters are examined in the EIAR should be guided by an assessment of the likelihood of their occurrence (risk)'.

Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EU (hereafter referred to as the Seveso III Directive) is considered in this assessment. S.I. No. 209/2015 – Chemical Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (hereafter referred to as the COMAH Regulations) transposed the Seveso III Directive into Irish law. 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 (HSA). Each Seveso site has a consultation zone which is the '*area liable to be affected by a major accident*' at the site (Department of the Environment, Community and Local Government (DECLG 2015)). Therefore, if a development falls within the specified consultation zone of a Seveso site, the HSA must be consulted. The Proposed Scheme does not fall within the consultation zone for any Seveso sites (please refer to Appendix A20.1 (Seveso Sites) in Volume 4 of this EIAR for further details), however a review of the potential for impacts on emergency response accesses to Seveso sites from their respective nearest hospital and fire stations was also undertaken.

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

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

20.2.1 Definitions

At the time of undertaking this assessment, no clear definition of the term 'major accident and / or disaster' has been outlined in the context of the EIA Directive. For the purpose of this assessment, the following definitions from the Institute of Environmental Management and Assessment (IEMA) Major Accidents and Disasters in EIA: A Primer (hereafter referred to as the IEMA Primer) (IEMA 2020) have been adopted:

- Accident – something that happens by chance or without expectation;
- Disaster – 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;
- Major Accident – events that threaten immediate or delayed serious environmental effects to human health, welfare and / or the environment and require the use of resources beyond those of the client or its appointed representatives to manage. Whilst malicious intent is not accidental, the outcome (e.g. train derailment) may be the same and therefore many mitigation measures will apply to both deliberate and accidental events;
- Risk – the likelihood of an impact occurring, combined with the effect or consequence(s) of the impact on a receptor if it does occur;
- Risk event – an identified, unplanned event, which is considered relevant to the Proposed Scheme and has the potential to result in a major accident and / or disaster, subject to assessment of its potential to result in a significant adverse effect on an environmental receptor;
- Vulnerability – describes the potential for harm as a result of an event, for example due to sensitivity or value of receptors. In the context of the EIA Directive, the term refers to 'exposure and resilience' of the Proposed Scheme to the risk of a major accident and / or disaster. Vulnerability is influenced by sensitivity, adaptive capacity and magnitude of impact; and
- Significant environmental effect (in relation to a major accident and / or disaster assessment) – includes the loss of life, permanent injury and temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration.

In addition, a ‘Significant’ impact resulting from major accidents and / or disasters is identified if it meets the criteria for ‘Significant’, ‘Very Significant’ or ‘Profound’ under the EPA Guidelines (EPA 2017). The assessment of major accidents and disasters reported in this chapter of the EIAR considers the occurrence of extreme and highly unlikely incidences. As such, it considers accident scenarios that would not reasonably be covered by the other topic assessments.

20.3 Methodology

20.3.1 Scope and Context

The identification, control and management of risk is an integral part of the design and assessment process throughout all stages of a project lifecycle. For example, a Flood Risk Assessment was carried out to assess the vulnerability of the Proposed Scheme to flooding in order to mitigate, where required. The elements of the Proposed Scheme that incorporate measures that are designed to eliminate, reduce, isolate, control or exploit the occurrence of major accidents have been described throughout this EIAR where required. Measures to control risks associated with Construction Phase activities are incorporated into the Construction Environmental Management Plan (CEMP) in Appendix A5.1 in Volume 4 of this EIAR.

The methodology for this risk assessment is as follows:

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

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

20.3.2 Legislation, Guidelines and Reference Material

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

- S.I. No. 291 of 2013 - Safety, Health and Welfare at Work (Construction) Regulations 2013 (hereafter referred to as the Safety, Health and Welfare (Construction) Regulations);
- Number 10 of 2005 - Safety, Health and Welfare at Work Act 2005 (hereafter referred to as the Safety, Health and Welfare at Work Act);
- S.I. No. 138/2012 - Building Regulations (Part A Amendment) Regulations 2012;
- S.I. No. 299/2007 - Safety, Health and Welfare at Work (General Application) Regulations 2007 (hereafter referred to as the Safety, Health and Welfare at Work (General Application) Regulations);
- Revised Guidelines on the Information to be Contained in Environmental Impact Statements (EPA 2015a);
- Advice Notes for Preparing Environmental Impact Statements (EPA 2015b);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – Draft August 2017 (EPA 2017);
- Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission 2017);
- IEMA Primer (IEMA 2020);
- A National Risk Assessment for Ireland 2020 (Government of Ireland 2020);
- Strategic Emergency Management National Structures and Framework (Department of Defence 2017);
- Guidance on Assessing and Costing Environmental Liabilities (EPA 2014);
- A Framework for Major Emergency Management. Guidance Document 10 (DECLG 2015); and
- The Department of Environment, Heritage and Local Government (DEHLG) A Framework for Major Emergency Management. A Guide to Risk Assessment in Major Emergency Management (Department of Environment, Heritage and Local Government (DEHLG 2010).

The following external plans and assessments have also informed the assessment:

- Major Emergency Plan of Dún Laoghaire-Rathdown County Council (DLRCC) (DLRCC 2017);
- Dublin City Council (DCC) Major Emergency Plan (DCC 2015); and
- Maximum Aircraft Movement Data and the Calculation of Risk and PSZs: Dublin Airport (Department of Transport and DEHLG 2005);

The following scheme specific documents have also informed the assessment:

- CEMP including topic addressed as follows:
 - Construction and Demolition Waste Management Plan;
 - Construction Traffic Management Plan;
 - Non-Native Invasive Species Management Plan;
 - Surface Water Management Plan; and
 - Environmental Incident Response Plan; and
- Flood Risk Assessment.

20.3.3 Risk Assessment Methodology

The risk assessment is set out in three stages:

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

20.3.3.1 Identification and Screening

The first stage of the assessment is to identify potential unplanned risks that the Proposed Scheme may be vulnerable to. An initial list of relevant hazards which may make the Proposed Scheme vulnerable to major accidents and / or disasters was sourced through consultation with relevant environmental specialists and the design engineers and by consulting the guidelines and reference documentation and grouped into ‘risk events’.

The list of potential risk events that could lead to major accidents and / or disasters (refer to Appendix A20.2 (Hazard Identification Record) in Volume 4 of this EIAR) was subjected to an initial screening assessment to identify those that meet the scoping criteria. Where appropriate, risk events were screened out of the assessment according to the following scoping criteria:

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

- Risk events in relation to existing emergency access arrangements and response plans for facilities along the route of the Proposed Scheme. Emergency accesses along the route of the Proposed Scheme will be retained insofar as is possible throughout the Construction Phase. Where construction works for the Proposed Scheme will interface with emergency access arrangements, the appointed contractor will consult with the affected landowners / site operators and the emergency services to agree, where required, alternative emergency access arrangements and changes to response plans for the duration of the works.

20.3.3.2 Risk Classification

Following the initial identification and screening process, the remaining major accidents and / or disasters risk events were evaluated with regard to the likelihood of occurrence and the potential impact. The rating criteria adopted for the assessment follows that used in A Guide to Risk Assessment in Major Emergency Management (DEHLG 2010). The EPA Guidelines (EPA 2017) state that the risk assessment must be based on a ‘worst-case’ approach. Therefore, the consequent rating assumes that all proposed mitigation measures and safety procedures have failed to prevent the occurrence of a major accident and / or disaster.

The classification and rating of likelihood and consequence, as taken from A Guide to Risk Assessment in Major Emergency Management are provided in Table 20.1 and Table 20.2.

Table 20.1: Classification of Likelihood

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

Table 20.2: Classification of Consequence

Rating	Classification	Impact	Description
1	Minor	Life, Health, Welfare, Environment, Infrastructure, Social	<ul style="list-style-type: none"> • Small number of people affected; no fatalities and small number of minor injuries with first aid treatment • No contamination, localised effects • <0.5 million euro • Minor localised disruption to community services or infrastructure (<6 hours)
2	Limited	Life, Health, Welfare, Environment, Infrastructure, Social	<ul style="list-style-type: none"> • Single fatality; limited number of people affected; a few serious injuries with hospitalisation and medical treatment required. Localised displacement of a small number of people for 6 - 24 hours. Personal support satisfied through local arrangements • Simple contamination, localised effects of short duration • 0.5 million to 3 million euro • Normal community functioning with some inconvenience
3	Serious	Life, Health, Welfare, Environment, Infrastructure, Social	<ul style="list-style-type: none"> • Significant number of people in affected area impacted with multiple fatalities (<5), multiple serious or extensive injuries (20), significant hospitalisation. Large number of people displaced for 6 - 24 hours or possibly beyond; up to 500 evacuated. External resources required for personal support. • Simple contamination, widespread effects or extended duration • 3 million to 10 million euro • Community only partially functioning, some services available
4	Very Serious	Life, Health, Welfare, Environment, Infrastructure, Social	<ul style="list-style-type: none"> • 5 to 50 fatalities, up to 100 serious injuries, up to 2,000 evacuated • Heavy contamination, localised effects or extended duration • 10 million to 25 million euro • Community functioning poorly, minimal services available
5	Catastrophic	Life, Health, Welfare, Environment, Infrastructure, Social	<ul style="list-style-type: none"> • Large numbers of people impacted with a significant number of fatalities (>50), injuries in the hundreds, more than 2000 evacuated. • Very heavy contamination, widespread effects of extended duration. • >25 million euro • Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support

20.3.3.3 Risk Evaluation

In accordance with A Guide to Risk Assessment in Major Emergency Management (DEHMG 2010), the evaluated major accidents and / or disasters risk events were compared to a risk matrix to determine the level of significance of each risk event. These have been grouped according to three categories:

- **High Risk** – events that have an evaluation score of 15 to 25, as indicated by the Red Zones in Table 20.3;
- **Medium Risk** – events that have an evaluation score of 8 to 12, as indicated by the Amber Zone in Table 20.3; and
- **Low Risk** – events that have an evaluation score of 1 to 6, as indicated by the Green Zone in Table 20.3.

Table 20.3: Levels of Significance

Likelihood	5 – Very likely					
	4 – Likely					
	3 – Unlikely					
	2 – Very unlikely					
	1 – Extremely unlikely					
		1 – Minor	2 – Limited	3 – Serious	4 – Very Serious	5 – Catastrophic

Consequence of Impact

Significant impacts resulting from major accidents and / or disasters are adverse impacts that are described as 'Significant', 'Very Significant' or 'Profound' under the EPA Guidelines (EPA 2017). Consequently, major accidents and / or disasters risk events that fall within the Amber or Red Zones ('Medium' or 'High' risk events) are considered to present risk of significant impacts and are brought forward for further consideration and assessment for mitigation.

20.4 Potential Impacts

20.4.1 'Do Nothing' Scenario

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

20.4.2 Risk Evaluation

As mentioned in Section 20.3, the potential impacts in this Section assume a worst-case scenario, which does not consider the implementation of mitigation measures or emergency plans which would be put in place to reduce the likelihood and potential impact of any major accidents and / or disasters.

A Risk Register has been developed which contains all the plausible scenarios identified during the Construction Phase and Operational Phase of the Proposed Scheme and has been evaluated using the criteria in Section 20.3, This is provided in Table 20.4.

Table 20.4: Rating of Major Accidents and Disasters in the Absence of Mitigation

Risk ID	Event	Proposed Scheme Element	Likelihood	Rating	Consequence	Rating	Resulting Risk Category
Construction Phase							
A	Utilities – Risk of gas explosion due to the strike of a gas mains during excavation works	Throughout	Unlikely	3	Serious Potential fatalities and injuries. Hazards associated with the explosion to neighbouring residents, businesses and activities. Potential to discharge deleterious material to adjacent watercourses Potential to disrupt gas supply – potential displacement of large number of people	3	Medium
B	Utilities – Risk of release of trapped gas under pavements that accumulates due to local gas leaks	Throughout	Unlikely	3	Minor Potential minor risk of poisoning. Simple contamination, localised effects of short duration	1	Low
C	Utilities – Risk of exposure to and release of untreated wastewater due to the strike of mains sewers and combined sewers during excavation	Throughout	Very Unlikely (Sewer depths are generally expected to be greater than excavation depths required for the Proposed Scheme)	2	Limited Potential injury due to pressurised discharge Hazards associated with exposure to untreated wastewater (diseases etc.) Potential discharge of untreated wastewater to adjacent watercourses Potential displacement of local residences and businesses in the event of flooding Potential to disrupt wastewater management systems	2	Low
D	Utilities – Risk of striking watermains supply	Throughout	Unlikely	3	Minor Potential minor injury for nearby personnel and potential displacement of local residences and business in the event of flooding. Clean mains water supply so no potential for contamination Potential to disrupt water supply	1	Low

Risk ID	Event	Proposed Scheme Element	Likelihood	Rating	Consequence	Rating	Resulting Risk Category
E	Utilities - Contact with / damage to high voltage and medium voltage power lines (overhead or buried)	Throughout	Very Unlikely (These are generally the easiest cables to detect remotely and should have warning marker tapes above them)	2	Serious Potential fatalities and injuries Potential to lead to fire and associated effects Potential to disrupt electricity / telecoms supply - localised disruption / inconvenience to community	3	Low
F	Utilities - Contact with / damage to low voltage power lines buried telecom services and / or fibre optic cables	Throughout	Unlikely	3	Limited Localised disruption / inconvenience to community	2	Low
G	Utilities – risk of death or injury due to moving of the electrical cabinets on Merrion Road and St. Vincent's University Hospital and the movement of the Electricity Supply Board (ESB) sub-station at Herbert Park.	Throughout (especially at Merrion Road, St. Vincent's University Hospital and Herbert Park.)	Very Unlikely	2	Limited Single fatality Limited number of people affected with localised disruption to services	2	Low
H	Structural damage / collapse	Throughout (especially in the disassembling and reassembling of Bloomfield Gate and archway, Blackrock College gates and pillars and St. Mary's Nursing Home archway)	Unlikely	3	Serious Potential fatalities and extensive injuries Irreparable structural damage to gates	3	Medium
I	Contamination Event - Risk of encountering unknown contaminated ground and mobilisation during construction / hazardous pipe materials (i.e. asbestos pipes) and potential damage to brittle pipes during construction works	Throughout (especially in relation to the demolition of historic lampposts, and the kiosk on Pembroke Road)	Unlikely	3	Limited Potential injury from exposure to hazardous substances Potential for a limited number of people to be affected and for short duration localised effects	2	Low

Risk ID	Event	Proposed Scheme Element	Likelihood	Rating	Consequence	Rating	Resulting Risk Category
J	Contamination Event – Pollution event leading to environmental damage to watercourses or groundwater, particularly associated with the potential release of silt to the aquatic environment	Locations near watercourses (especially in the vicinity of the Elm Park stream, Booterstown stream, Priory stream and Brewery stream which all discharge directly into Dublin Bay)	Likely	4	Very serious Potential to cause heavy contamination of extended duration to the aquatic environment, associated species and to ecologically designated areas	4	High
K	Ground Collapse / Instability - Risks associated with coming into contact with basements and risk of collapse due to differences in ground levels.	Throughout (especially along Baggot Street Upper, Baggot Street Lower, and Fitzwilliam Street Lower where there are known basements. Ground level differences exist between Castledawson Avenue and the lands within the boundary wall)	Unlikely	3	Limited Predominately shallow excavations required.	2	Low
L	Collapse of steep embankment between the road and Blackrock Park	Blackrock Park	Unlikely	3	Limited Potential fatality / injuries Simple contamination, localised effects of short duration	2	Low
M	Transport Accident - Major road traffic accident resulting from a collision between construction traffic and public traffic i.e. cars, buses, Heavy Goods Vehicles (HGVs), in addition to pedestrians and cyclists using the road or footpaths.	Throughout	Likely	4	Serious Potential fatalities and injuries Potential to lead to fire and associated effects Potential to discharge deleterious material (e.g. fuel) to watercourses Potential for damage to transport infrastructure and disruption to transport services	3	Medium

Risk ID	Event	Proposed Scheme Element	Likelihood	Rating	Consequence	Rating	Resulting Risk Category
N	Transport Accident - Risk of accidents due to interface of construction works with other public transport infrastructure such as rail.	Minor interface (c. 200m) with the DART line along the R118 Merrion Road.	Very Unlikely	2	Very Serious Potential for a significant number of fatalities and injuries, Potential to lead to fire and associated effects Potential for significant discharge deleterious material (e.g. fuel) into watercourses and ecological designated sites Potential for significant damage to transport infrastructure and disruption to services	4	Medium
O	Transport Accident - Aircraft related accident due to Dublin Airport flight paths.	Flight path crossing the R113 / R119 on the Blackrock Section	Extremely Unlikely	1	Very Serious Potential for a significant number of fatalities and injuries, Potential for significant damage to infrastructure and disruption to the road network.	4	Low
P	Biosecurity - Risk of spread of invasive species during construction works, particularly during site clearance works	Throughout	Likely	4	Serious Contamination with extended duration and potential to lead to more widespread effects	3	Medium
Q	Tree Stability - Risk of trees with unstable roots falling during surface and excavation works / potential for contact with overhead lines, residents, properties, pedestrians and road users	Throughout	Unlikely	3	Limited Potential fatality and injuries Localised effects and short duration. Potential for some minor damage to local infrastructure	2	Low
R	Extreme Weather Event – Risk of extreme weather events such as prolonged flooding resulting in sediment load runoff during construction, storm damage, snowstorm, wildfire.	Throughout	Unlikely	3	Very Serious – due to proximity with Natura 2000 sites. Potential to cause heavy contamination of extended duration to the aquatic environment, associated species and to ecologically designated areas	4	Medium
S	Industrial Incident – Explosion / fire occurring at adjacent facility containing flammable / hazardous substances (i.e. petrol station)	Throughout	Very Unlikely	2	Limited Potential for damage to transport infrastructure and disruption to services	2	Low
T	Disruption to emergency response vehicles (fire, ambulance and Garda)	Throughout (especially in the vicinity of St Vincent's University Hospital)	Likely	4	Very serious Potential for a significant number of fatalities and injuries	4	High
Operational Phase							

Risk ID	Event	Proposed Scheme Element	Likelihood	Rating	Consequence	Rating	Resulting Risk Category
U	Structural collapse	Throughout (especially Merrion Gates)	Very Unlikely	2	Serious Potential fatalities and injuries Disruption to rail service	3	Low
V	Transport Accident - Aircraft related accident due to location under flight path.	Flight path crossing the R113 / R119 on the Blackrock Section	Extremely Unlikely	1	Very Serious Potential for a significant number of fatalities and injuries, Potential for significant damage to infrastructure and disruption to the road network.	4	Low
W	Extreme Weather Event – Risk of extreme weather events such as prolonged flooding resulting in sediment load runoff, storm damage, snowstorm, wildfire.	Throughout	Unlikely	3	Limited Potential for localised damage to infrastructure	2	Low
X	Industrial Incident – Explosion / fire occurring at adjacent facility containing flammable / hazardous substances (i.e. petrol station)	Throughout	Very Unlikely	2	Limited Potential for localised damage to infrastructure	2	Low

The results from the evaluation have been applied to Table 20.5.

Table 20.5: Evaluation of Levels of Significance in the Absence of Mitigation

Likelihood	5 – Very likely					
4 – Likely			[M] [P]	[J] [T]		
3 – Unlikely	[B] [D]	[F] [I] [K] [L] [Q] [W]	[A] [H]	[R]		
2 – Very unlikely		[C] [G] [S] [X]	[E] [U]	[N]		
1 – Extremely unlikely				[O] [V]		
	1 – Minor	2 – Limited	3 – Serious	4 – Very Serious	5 – Catastrophic	
	Consequence of Impact					

From examining the plausible risks presented in Table 20.4, Risk IDs B, C, D, E, F, G, I, K, L, N, O, Q, S, U, V, W and X are considered as being below the threshold of significance set for the purposes of this assessment ('Green Zone' or 'Low' risk event).

Considering Risk IDs A, H, M, N, P and R fall within the Amber Zone ('Medium' risk event) and Risk ID's J and T fall within the Red Zone ('High' risk scenario), these are therefore brought forward for further consideration and assessment of mitigation measures. These eight Risk IDs fall within the Construction Phase. No Operational Phase risks fell within the Amber Zone and are therefore not considered further.

The scenarios with the highest risk score relate to J, M, P and T associated with the Proposed Scheme.

20.4.3 Seveso Sites

A review of Upper Tier and Lower Tier Seveso sites in the Greater Dublin Area and their respective distances from the Proposed Scheme was undertaken. This is presented in Appendix A20.1 (Seveso Sites) in Volume 4 of this EIAR. The Proposed Scheme does not fall within the consultation zone for any Seveso sites

A review of the traffic impact assessment reported in Chapter 6 (Traffic & Transport) has also been undertaken to determine the potential for impacts on emergency response accesses to Seveso sites (as outlined in Appendix A20.1 Seveso Sites in Volume 4 of this EIAR) from their respective nearest hospital and fire stations. No significant impacts on emergency response times are anticipated.

20.5 Mitigation and Monitoring Measures

20.5.1 Inherent Design

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

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

accordance with these requirements, the Proposed Scheme engineering design team established a consistent and appropriate means of assessing the risks that may arise from design decisions and of applying the General Principles of Prevention, mitigation measures that are to be embedded into the design of the Proposed Scheme.

20.5.2 Plans and Procedures

The plans outlined in this Section have been developed to effectively manage and minimise risk by ensuring that every reasonable effort will be made to ensure that environmental impacts during construction will be avoided or reduced, where possible. Specific mitigation measures are also included in the relevant Chapters of this EIAR.

20.5.2.1 Construction Environmental Management Plan (CEMP)

A Construction Environmental Management Plan (CEMP) has been prepared and is included as Appendix A5.1 in Volume 4 of this EIAR. The CEMP will be updated by the NTA prior to the commencement of the Construction Phase, so as to include any additional measures required pursuant to conditions attached to any decision to grant approval. It will be a condition of the Employer's Requirements that the successful contractor, immediately following appointment, must detail in the CEMP the manner in which it is intended to effectively implement all the applicable mitigation measures identified in this EIAR. The CEMP has regard to the guidance contained in the TII Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan, and the handbook published by Construction Industry Research and Information Association (CIRIA) in the UK, Environmental Good Practice on Site Guide, 4th Edition (CIRIA 2015).

The CEMP summarises the overall environmental management strategy that could be adopted and implemented during the Construction Phase of the Proposed Scheme and must be read in conjunction with the construction details outlined in Chapter 5 (Construction) in this EIAR.

Details of mitigation measures proposed to address potential impacts arising from construction activities are described in Chapter 6 (Traffic & Transport) to Chapter 21 (Cumulative Impacts & Environmental Interactions) as appropriate and are summarised in Chapter 22 (Summary of Mitigation & Monitoring Measures) of this EIAR.

20.5.2.2 Construction and Demolition Resource and Waste Management Plan

Construction and Demolition Resource and Waste Management (CDRWMP) is addressed in the CEMP to demonstrate how waste arising during the Construction Phase (including) demolition works of the Proposed Scheme will be managed and disposed of in a way that ensures compliance with the provisions of Number 10 of 1996 – Waste Management Act, 1996, as amended. The CDRWMP will be developed by the appointed contractor.

20.5.2.3 Construction Traffic Management Plan

The Construction Traffic Management Plan (CTMP) has been prepared to demonstrate the manner in which the interface between the public and construction-related traffic will be managed and how vehicular movement will be controlled. It will be a condition of the Employer's Requirements that the successful contractor, immediately following appointment, must detail in the CTMP the manner in which it is intended to effectively implement all the applicable mitigation measures identified in this EIAR and any additional measures required pursuant to conditions imposed by An Bord Pleanála, should they grant approval. Further details on the assessment of construction traffic, and traffic related mitigation measures are provided in Chapter 6 (Traffic & Transport) of this EIAR.

20.5.2.4 Non-Native Invasive Species Management Plan

Non-Native Invasive Species Management is addressed in the CEMP to provide the strategy that will be adopted during the construction of the Proposed Scheme in order to manage and prevent the spread of non-native invasive plant species. The Non-Native Invasive Species Management Plan will be developed by the appointed contractor using a suitably qualified ecologist as necessary.

Non-native invasive plant species have been identified and documented within the Proposed Scheme boundary, as well as in close proximity to the Proposed Scheme boundary. The survey results have been provided in the CEMP, in addition to potential management options for the treatment of non-native species.

20.5.2.5 Surface Water Management Plan

Surface Water Management is addressed in the CEMP, summarising the procedures and technical practices for implementing effective sediment, erosion and pollution control that will be adopted during the Construction Phase of the Proposed Scheme. The Surface Water Management Plan will be developed by the appointed contractor.

20.5.2.6 Environmental Incident Response Plan

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

This assessment has considered the reasonable worst-case consequences, and as such, risks are unlikely to be greater than those that have been assessed within this EIAR. However, activities on-site will be monitored and controlled to ensure that risk does not increase over time.

Table 20.6: Major Accidents and / or Disasters – Assessment of Mitigation Measures

Risk ID	Event	Pre-Mitigation Risk Score	Mitigation Measures [Including Confirmatory Studies]	Post-Mitigation Likelihood	Post-Mitigation Consequence of Impact	Post Mitigation Risk Score
Construction Phase						
A	Utilities – Risk of gas explosion due to the strike of a gas mains during excavation works	Medium	Refer to Chapter 5 (Construction) and to Appendix A5.1 CEMP in Volume 4 of this EIAR for details of mitigation measures to be put in place.	2 Very unlikely	3 Serious	Low
H	Structural damage / collapse	Medium	Refer to Chapter 5 (Construction), Appendix A5.1 CEMP in Volume 4 of this EIAR for details on construction works management and mitigation measures to be put in place.	2 Very unlikely	3 Serious	Low
J	Contamination Event – Pollution event leading to environmental damage to watercourses or groundwater, particularly associated with the potential release of silt to the aquatic environment	High	Refer to Chapter 13 (Water), Chapter 14 (Land, Soils, Geology & Hydrogeology), and Appendix A5.1 CEMP in Volume 4 of this EIAR for details of mitigation measures to be put in place.	2 Very unlikely	3 Serious	Low
M	Transport Accident - Major road traffic accident resulting from a collision between construction traffic and public traffic i.e. cars, buses, HGVs, in addition to pedestrians and cyclists using the road or footpaths.	Medium	Refer to Chapter 5 (Construction), Appendix A5.1 CEMP in Volume 4 of this EIAR for details on construction works management and mitigation measures to be put in place.	2 Very unlikely	3 Serious	Low
N	Transport Accident - Risk of accidents due to interface of construction works with other public transport infrastructure such as rail.	Medium	Refer to Chapter 5 (Construction), Appendix A5.1 CEMP in Volume 4 of this EIAR for details on construction works management and mitigation measures to be put in place.	2 Very unlikely	3 Serious	Low
P	Biosecurity - Risk of spread of invasive species during construction works, particularly during site clearance works	Medium	Refer to Chapter 12 (Biodiversity), and Appendix A5.1 CEMP in Volume 4 of this EIAR for details of mitigation measures to be put in place.	2 Very unlikely	3 Serious	Low
R	Extreme Weather Event – Risk of extreme weather events such as prolonged flooding resulting in sediment load runoff during construction, storm damage, snowstorm, wildfire.	Medium	Refer to Chapter 13 (Water), Chapter 14 (Land, Soils, Geology & Hydrogeology), and Appendix A5.1 CEMP in Volume 4 of this EIAR for details of mitigation measures to be put in place.	2 Very unlikely	3 Serious	Low
T	Disruption to emergency response vehicles (fire, ambulance and guards)	High	Refer to Chapter 5 (Construction), Appendix A5.1 CEMP in Volume 4 of this EIAR for details on construction works management and mitigation measures to be put in place.	2 Very unlikely	3 Serious	Low
Operational Phase						
N/A						

Table 20.7: Evaluation of Levels of Significance - Post-Mitigation

Likelihood	5 – Very likely					
	4 – Likely					
	3 – Unlikely					
	2 – Very unlikely			[A] [H] [J] [M] [N] [P] [R] [T]		
	1 – Extremely unlikely					
		1 – Minor	2 – Limited	3 – Serious	4 – Very Serious	5 – Catastrophic
	Consequence of Impact					

20.6 Residual Impacts

There are no identified incidents and / or major accidents and / or disasters risk events that present a sufficient combination of risk and consequence that would lead to significant residual environmental impacts.

No significant residual impacts have been identified either in the Construction or Operational Phases of the Proposed Scheme, whilst meeting the scheme objectives set out in Chapter 1 (Introduction).

20.7 References

- DCC (2015). Dublin City Council Major Emergency Plan.
- DECLG (2015). A Framework for Major Emergency Management. Guidance Document 10.
- DEHLG (2010). A Framework for Major Emergency Management. A Guide to Risk Assessment in Major Emergency Management.
- Department of Defence (2017). Strategic Emergency Management National Structures and Framework.
- Department of Transport and DEHLG (2005). Maximum Aircraft Movement Data and the Calculation of Risk and PSZs: Dublin Airport
- DLRCC (2017). Major Emergency Plan of Dún Laoghaire-Rathdown County Council.
- EPA (2014). Guidance on Assessing and Costing Environmental Liabilities.
- EPA (2015a). Revised Guidelines on the Information to be Contained in Environmental Impact Statements
- EPA (2015b). Advice Notes for Preparing Environmental Impact Statements.
- EPA (2017). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. Draft. August 2017.
- European Commission (2017). Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report.
- Government of Ireland (2020). National Risk Assessment 2020.
- IEMA (2020). Major Accidents and Disasters in EIA: A Primer.

Directives and Legislation

Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014

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

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

Number 10 of 1996 – Waste Management Act, 1996 (as amended).

Number 10 of 2005 - Safety, Health and Welfare at Work Act 2005 (as amended).

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

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

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

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