

15 Major Accidents and Interaction of Impacts

This chapter sets out the assessment of the potential for major accidents and natural disasters to impact on the WOP and ADF site and also from those which could occur as a result of the WOP and ADF and the proposed development operation.

It also addresses the main interactions between different environmental aspects potentially impacted by the proposed development.

15.1 Major Accidents and Natural Disasters

15.1.1 Introduction

This section describes the expected significant effects on the environment arising from the vulnerability of the proposed development to risks of major accidents and/or natural disasters which are relevant to the project. This assessment is carried out in compliance with the EIA Directive which states the need to assess:

“the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or natural disasters which are relevant to the project concerned.”

As set out in the EIA guidance there are two considerations, namely:

- The potential of the project to cause accidents and/or disasters, including implications for human health, cultural heritage, and the environment;
- The vulnerability of the project to potential disasters/accidents, including the risk to the project of both natural disasters (e.g. flooding) and man-made disasters (e.g. technological disasters).

Based on the requirements of the EIA Directive, this assessment determines:

- The relevant major accidents and/or natural disasters, if any, that the proposed development could be vulnerable to;
- The potential for these major accidents and/or natural disasters to result in likely significant adverse environmental effect(s); and
- The measures (the ‘Control Measures’) that are in place, or need to be in place, to prevent or mitigate the likely significant adverse effects of such events on the environment.

15.1.2 Assessment Methodology

The scope and methodology presented in the following sections is based on the provisions of the EIA Directive, the draft EPA Guidelines, department guidance namely A Framework for Major Emergency Management¹ and professional judgement.

¹ A Guide to Risk Assessment in Major Emergency Management, Guidance Document 1 (DEHLG, 2010).

It is further based on the understanding of the existing facility (both the Station and the ADF), their design, their established operation and the nature of the proposed development. Where a risk is identified, it is considered in the context of the baseline environment – i.e. the existing scenario having regard to all permitted development and whereby the Station and associated ADF ceases operation at the end of 2020 and the site are appropriately decommissioned and remediated. As noted throughout this EIAR, this baseline is considered but the established and operational nature of the sites is also acknowledged. The assessment of the risk considers all factors defined in the EIA Directive that have been considered in this EIAR, i.e. population and human health, biodiversity, land, soil, water, air and climate and material assets, cultural heritage and the landscape as applicable.

Step 1 - Risk identification - identifies and quantifies risks focusing on unplanned, but possible and plausible events occurring during any stage of the proposed development. In accordance with the relevant Guidance, risks are identified in respect of the project’s potential vulnerability to disaster risks; and (2) potential to cause accidents and/or disasters. The risk identification exercise has been completed to identify the most likely risks associated with major accidents and/or natural disasters. For the purposes of that analysis, major accidents or natural disasters are hazards that have the potential to affect the proposed development. These include accidents that occur both during construction and operational phases.

Risk identification has had regard to the following:

- The Environmental Liabilities Risk Assessment (ELRA) undertaken for the existing Station (ESB, 2016); and
- The risk assessment analysis of the environmental aspects of the station undertaken as part of the stations certified EMS.
- Flood Risk assessment undertaken for the propose development (ESBI, 2018).

Step 2 – Assign Likelihood of Risk - A reasonable approach has been taken to risk assessment whereby any risk from or to the proposed development that is considered in term of extremely unlikely to very likely. The likelihood ratings that have been applied are as set out in **Table 15-1**.

Table 15-1: Risk Classification Table - Likelihood (Source: A Framework for Major Emergency Management Guidance, Document 1: A Guide to Risk Assessment in Major Emergency Management, January 2010)

Ranking	Likelihood	Description
1	Extremely Unlikely	May occur only in exceptional circumstances; once every 500 or more years.
2	Very Unlikely	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or very few incidents in associated organisations, facilities or communities; and / or little opportunity, reason or means to occur; may occur once every 100-500 years.
3	Unlikely	May occur at some time; and /or few, infrequent, random recorded incidents or little anecdotal evidence; some incidents in associated or comparable organisation’s worldwide; some

Ranking	Likelihood	Description
		opportunity, reason or means to occur; may occur once per 10-100 years.
4	Likely	Likely to or may occur; regular recorded incidents and strong anecdotal evidence and will probably occur once per 1-10 years
5	Very Likely	Very likely to occur; high level of recorded incidents and/or strong anecdotal evidence. Will probably occur more than once a year.

Step 3 Risk Classification – is an assessment of that risk based on standardised classification of likelihood. This assessment is carried out having regard to the operational procedures in place – including the safety procedures and environmental controls that are in place – noting the licensed status of the sites. The consequence rating assigned to each risk has assumed that all proposed mitigation measures and/or safety procedures have failed to prevent the major accident and/or disaster. The consequence ratings that have been applied are as set out below, see **Table 15.2**.

Table 15-2: Risk Classification Severity Table – Consequence*

Rank	Consequence	Impact	Description
1	Minor	Life, Health, Welfare	Small number of people affected; no fatalities and small number of minor injuries with first aid treatment.
		Environment	No contamination, localised effects
		Infrastructure	<€0.5M Euros
		Social	Minor localised disruption to community services or infrastructure. (<6 hours).
2	Limited	Life, Health, Welfare	Single fatality; limited number of people affected, potential for serious injury with hospitalisation and medical treatment required. Localised displacement of a small number of people for 6-24 hours. Support through local arrangements.
		Environment	Simple contamination, localised effects of short duration.
		Infrastructure	€0.5-3M
		Social	Normal community functioning with some inconvenience.
3	Serious	Life, Health, Welfare	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.

Rank	Consequence	Impact	Description
			External resources required for personal support.
		Environment	Simple contamination, widespread effects or extended duration
		Infrastructure	€3-10M
		Social	Community only partially functioning, some services available.
4	Very serious	Life, Health, Welfare	5 to 50 fatalities, up to 100 serious injuries, up to 2000 evacuated
		Environment	Heavy contamination, localised effects or extended duration
		Infrastructure	€10-25M Community functioning
		Social	Community functioning poorly, minimal services available
5	Catastrophic	Life, Health, Welfare	Large numbers of people impacted with significant numbers of fatalities (>50), injuries in the hundreds, more than 2000 evacuated.
		Environment	Very heavy contamination, widespread effects of extended duration.
		Infrastructure	>€25M
		Social	Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support.

* Source: A Framework for Major Emergency Management Guidance, Document 1: A Guide to Risk Assessment in Major Emergency Management, January 2010)

Step 4 – Assign Risk Significance – based on the assessment of likelihood and severity, the risk matrix is developed. This allows for the evaluation of the risk.

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

15.1.3 Baseline Conditions

Again, the baseline environment is the scenario whereby the Station and associated ADF cease operation at the end of 2020 and the site are appropriately decommissioned and remediated. As noted throughout this EIAR, this baseline is considered but the established and operational nature of the sites is also acknowledged.

15.1.4 Natural Disasters

Severe weather conditions and associated extreme weather events – such as flooding and flash flooding have been identified as risk particularly as the WOP Station Site is adjacent to the River Shannon.

A Flood Risk Assessment (FRA) in line with the Guidelines for Planning Authorities (GPA) 20: The Planning System and Flood Risk Management (OPW, 2009), has been conducted for the proposed development for both the station and the ADF sites detail of the baseline conditions in relation to flooding are contained within Appendix 8.1.

15.1.5 Major Accidents

Both WOP Station and the associated ADF are subject to Industrial Emissions Licences P0611-02.

WOP Station also operates an Environmental Management System (EMS) certified to ISO14001:2015. The management of the environmental aspects of the WOP Station site including the ADF complies with this EMS under ISO14001.

The occurrence of a major emission, fire or explosion resulting from a SEVESO site as defined by Directive 2012/18/EU, relating to the control of major-accident hazards involving dangerous substances, has the potential to give rise to a major accident or disaster, immediate or delayed, inside or outside the establishment, and involving one or more dangerous substances. Neither site is a SEVESO site. Neither site is proximate to a SEVESO facility. The occurrence of a major emission, fire or explosion resulting from a SEVESO site is therefore not applicable.

Given the highly maintained nature of both sites; their licensed status; and on-going operations and maintenance which is completed in-line with prevailing standards and good practice, the likelihood of a major accidents resulting from the proposed development will be very unlikely. There will be no change to the fuel handling equipment within the station but biomass storage will occur on concrete slab areas and in one pellet silo on site. The potential for accidents and incidents on both sites does exist. While these are of lesser consequence due to the absence of a SEVESO site, these are considered below. Typically these relate to industrial incidents – principally those relating to fire, explosion, etc.

15.1.6 Likely Significant Effects

15.1.6.1 The Do Nothing Scenario

In the do-nothing scenario, the potential risk of the proposed development causing, or being affected by a disaster and/or accident would be eliminated.

15.1.6.2 Assessment of Effects during Construction

Risks specific to the construction of the proposed development have been identified. These relate to flooding and the risk of accidents or disasters. These are considered in Table 15.3 below.

15.1.7 Vulnerability of the project to Risk of Major Accident and or disasters

A number of risks specific to the operation of the proposed development have been identified. These are considered in Table 15.3 below. This table also details the control measures or mitigation in place for the proposed development. In the absence of the control measure high risks have been identified. However, the residual risk or vulnerability of a major accident and/or disaster during the construction and operation of the proposed development is considered 'low' with regards to the risk evaluation methodology.

Table 15-3: Identification of Risks

Risk	Description of Potential Hazard	Uncontrolled Risk			Control Measure	Controlled (Residual) Risk			EIAR ref is required
		Likelihood	Severity	Risk		Likelihood	Severity	Risk	
Flooding (During Construction)	<ul style="list-style-type: none"> Risk of flooding to plant. Flooding could occur to low lying areas of the plant along the riverbank area. Risk of planting causing flooding to nearby properties or land Health and safety risk for operatives 	3	2		<ul style="list-style-type: none"> Based on the assessment undertaken, there is no significant risk of flooding to the proposed works areas at WOP Station. It has been concluded that the site of the new works lies within Flood Zone C as defined by the guideline document to Planning Authorities in relation to Flood Risk Management. The proposed works within the station will not increase the current flood risk in the catchment. In relation to the ADF this is located in Flood Zone C and therefore has a low risk of flooding. In addition the risk of pluvial and groundwater flooding are considered minimal and the design and operation of the facility will ensure there is no increased flood risk elsewhere due to the proposed development. The proposed development is therefore considered to be in overall compliance with the objectives of the Planning and Flood Risk Management Guidelines. Drainage Design 	2	2		<p>The Flood Risk Assessment for both the station and the ADF site are contained in Appendix 8.2.</p> <p>The drainage design for the proposed project is contained in Appendix 8.5.</p>
Fire	<ul style="list-style-type: none"> Health and safety risk. Contamination of surface waters from fire water release. Potential contamination of air. Accumulation of residual biomass fuels which may give rise to self-heating. 	3	3		<ul style="list-style-type: none"> Procedures in place include: <ul style="list-style-type: none"> SMS 10.2 Procedure the Event of Fire EMS 10.1-03 - Accident prevention procedure EMS 10.1-01 - Emergency Procedures for Chemical spill, Fires, Crisis and national Electrical System Emergency EMS 9.1-04 - Procedure for Maintenance of Power Plant to Minimise Environmental Impacts Measures in place include: <ul style="list-style-type: none"> Sprinkler/Deluge system: On main rising belt, turbines, etc. Smoke detection system on turbines and at CW pump-house. All transformers have a deluge system. Fire extinguishers, Fire-fighting Foam. Dry and wet risers. Provision of emergency service response from local county council. Fire safety evacuation drills & training. Plant modifications such as fire protection and detection systems arising from safe use of biomass relating to fire and explosion safety will be communicated to the relevant local authorities and local fire safety authority. 	2	2		<p>Chapter 5- Population and Human Health</p> <p>Chapter 8 – Surface water</p>
Explosion on the WOP Station Site	<ul style="list-style-type: none"> Excess dust and potential risk of explosion. 	3	4		<ul style="list-style-type: none"> HAZOP Study is being implemented by third party to specifically address biomass related risks, zoning of hazardous areas and reclassification if required based on the characteristics of pea and biomass fuels Procedures in place include: <ul style="list-style-type: none"> SMS 10.2 Procedure the Event of Fire EMS 10.1-03 - Accident prevention procedure 	2	3		<p>Chapter 5- Population and Human Health</p>

Risk	Description of Potential Hazard	Uncontrolled Risk			Control Measure	Controlled (Residual) Risk			EIAR ref is required
		Likelihood	Severity	Risk		Likelihood	Severity	Risk	
					<ul style="list-style-type: none"> o EMS 10.1-01 - Emergency Procedures for Chemical spill, Fires, Crisis and national Electrical System Emergency o EMS 9.1-04 - Procedure for Maintenance of Power Plant to Minimise Environmental Impacts • Measures in place include: <ul style="list-style-type: none"> o Station Explosion Protection Document (EPD) forms a crucial part of the Safety Management System for the station o Explosion vents (relief hatches) installed throughout the fuel handling system to allow for pressure release without structural failure in the event of a pressure excursion. o Scheduled regular maintenance to prevent dust accumulation o Sprinkler/Deluge system: On main rising belt, turbines, etc. o Smoke detection system on turbines and at CW pump-house. o All transformers has a deluge system. o Fire extinguishers, Fire-fighting Foam. o Dry and wet risers. o Provision of emergency service response from local county council. o Fire safety evacuation drills & training. 				
Bio hazard associated with biomass fuel	<ul style="list-style-type: none"> • Prolonged storage of any biomass fuels promoting biological activity such as composting, formation of mould and off-gassing of biomass fuels. 	4	2		<ul style="list-style-type: none"> • A strict hygiene regime will be implemented at the station prohibiting prolonged storage of any biomass fuels, thus impeding self-heating which gives rise to biological activity such as composting, formation of mould and off-gassing of biomass fuels. The storage on the slabs and within the silos will have a typical residency of 2-3 days. • All Health and Safety Training relevant to the handling, storage and co-firing operations of biomass fuels will be provided to station personnel as appropriate. 	2	2		Chapter 5- Population and Human Health
Flooding (During Operation)	<ul style="list-style-type: none"> • Risk of flooding plant. Flooding could occur to low lying areas of the plant along the riverbank area • Risk of planting causing flooding to nearby properties or land • Health and safety risk 	2	2		<ul style="list-style-type: none"> • Based on the assessment undertaken, there is no significant risk of flooding to the proposed works at WOP Station. It has been concluded that the site of the new works lies within Flood Zone C as defined by the guideline document to Planning Authorities in relation to Flood Risk Management. The proposed works within the station will not increase the current flood risk in the catchment. • In relation to the ADF this is located in Flood Zone C and therefore has a low risk of flooding. In addition the risk of pluvial and groundwater flooding are considered minimal and the design and operation of the facility will ensure there is no increased flood risk elsewhere due to the proposed development. • The proposed development is therefore considered to be in overall compliance with the objectives of the Planning and Flood Risk Management Guidelines. • Drainage Design 	2	2		<p>The Flood Risk Assessment for both the station and the ADF site are contained in Appendix 8.2.</p> <p>The drainage design for the proposed project is contained in Appendix 8.5.</p>

Risk	Description of Potential Hazard	Uncontrolled Risk			Control Measure	Controlled (Residual) Risk			EIAR ref is required
		Likelihood	Severity	Risk		Likelihood	Severity	Risk	
Spillage, Leaks or Releases (incl construction)	<ul style="list-style-type: none"> Contamination of surface water drainage system Contamination of groundwater Aldehydes and gases which may be emitted by the biomass fuels building up to toxic concentrations within enclosed storage spaces such as silos. 	4	1-4 ²		<ul style="list-style-type: none"> Procedures in place <ul style="list-style-type: none"> EMS 11.2-04 - Procedure for Testing of Bunds & Safety Shower Checks EMS 10.1-06 - Oil Spill Response Plan EMS 10.1-01 - Emergency Procedures for Chemical spill, Fires, Crisis and national Electrical System Emergency EMS 9.1-04 - Procedure for Maintenance of Power Plant to Minimise Environmental Impacts. Oil interceptors All bulk chemical storage tanks are bunded. Procedures are in place for unloading operations. Inspection procedures are in place to check adequacy of bunds. Oils stored in drums are located in a designated oil storage area designed to accommodate leaks and spills. Strict confined space procedures and protection measures that includes appropriate personal protection equipment (PPE) will be implemented which will protect personnel from toxic concentrations of aldehydes and toxic gases which may be emitted by the biomass fuels within enclosed storage spaces such as silos. 	2	2		Chapter 5- Population and Human Health Chapter 7- Land, Soil, Geology and Hydrogeology Chapter 8 – Surface water
ADF Liner Failure	<ul style="list-style-type: none"> Contamination of groundwater 	3	3		<ul style="list-style-type: none"> Operational Plan- Operational Plan For West Offaly Ash Disposal Facility Licence Register Number: P0611-02 (BnM, 2014) IE Licence Monitoring 	2	2		Chapter 7- Land, Soil, Geology and Hydrogeology
Traffic Accident	<ul style="list-style-type: none"> Health and safety risk 	4	3		<ul style="list-style-type: none"> Delivery Management Plan 	2	3		Chapter 7- Population and Huma Health Chapter 12 -Traffic

² It is noted that the degree of risk is variable depending on substance spilled, the scale and the location of the spill.

15.2 Interaction of Impacts

In addition to the requirement to describe the likely significant effects of the proposed development on specific environmental topics, the assessment of interactions of those effects is also required. This Chapter addresses the main interactions between different environmental aspects potentially impacted by the proposed development.

15.2.1 Assessment Methodology

Cumulative impacts including intra project cumulative impacts have been considered throughout the environmental impact assessment process and are discussed in each relevant chapter. A summary of the significant cross media interactions that were considered as part of the assessment is provided herein.

15.2.2 Cross Media Impacts

A summary table of the potential interactions and inter-relationships is presented in **Table 15-1**. Each aspect of the environment which is considered in the appropriate sections of the EIAR is cross-tabulated against all other aspects that have also been considered.

15.2.3 Population and Human Health

Impacts relating to population and human health have the potential to be impacted by other environmental aspects such as Land, Soils, Geology and Hydrogeology, Surface Water, Noise, Climate and Air, Material Assets, Traffic and Transport, Landscape and Visual and Cultural Heritage. Human beings require high quality water and high air quality for everyday life and also for recreational purposes. Quality of life can also be impacted by noise and traffic.

15.2.4 Biodiversity

Impacts relating to Biodiversity have the potential to be impacted by other environmental aspects including Population and Human Health, Land, Soils, Geology and Hydrogeology, Surface Water, Noise, Climate and Air, Material Assets and Traffic and Transport. The supply of fuel to WOP station requires the ongoing harvesting of peat soils at from a number of supply bogs. The potential effects to biodiversity relating to peatlands were considered. The potential for pollutants to impact upon ecological receptors via surface soil/water and groundwater pathways were considered. Effects on biodiversity from dust arising from construction and operational phases (such as effects on photosynthesis, transpiration and respiration in plant species) and from air emissions from the station were also considered. Disturbance effects to fauna (particularly avifauna) as a consequence of noise and vibration arising from construction and operational activities (including HGV deliveries and peat harvesting). Human activity may lead to disturbance or displacement of certain sensitive species. Such effects were considered in relation to the construction and operational phases, as well as in relation to peat supply.

15.2.5 Land, Soil, Geology and Groundwater

Impacts relating to Land, Soil, Geology and Groundwater have the potential to be impacted by other environmental aspects including Surface Water and Material Assets. The potential for pollutant pathways between surface soil/water and groundwater and the potential for leachate generation to impact surface waterbodies were considered.

15.2.6 Surface Water

Impacts relating to Land, Soil, Geology and Groundwater have the potential to be impacted by other environmental aspects including Population and Human Health, Biodiversity, Surface Water and Material Assets. During the construction phase, the potential for increased sedimentation and pollution of local waterbodies (River Shannon and the Gowlan River) to affect biodiversity was considered. During the operational phase, the potential for operational discharges to effect the water quality and in turn affect biodiversity was considered. The potential effects to waterbodies (namely water quality) from the supply of peat and biomass to the station affecting biodiversity was considered. The potential for pollutant pathways between surface soil/water and groundwater and the potential for leachate generation to impact surface waterbodies were considered. Impacts on the surrounding surface water quality in terms of water abstractions and the potential to increase flood risk was considered in terms of affecting the local population.

15.2.7 Climate and Air Quality

Impacts relating to Climate have the potential to impact human beings arising from global warming leading to climate changes such as increased rainfall and flood risk, increased temperatures giving rise to health effects, severe weather events and impacts on ecosystems which could influence food supply. Impacts to air quality from dust and greenhouse gas emissions can also impact on Human Health giving rise to respiratory effect related illnesses and also to vegetation damage and ecosystem impact. The potential for such air emission related impacts were considered and modelled as part of the assessment.

15.2.8 Noise

Impacts relating to noise can impact on Population and Human Health and Biodiversity through disturbance of habitat and nuisance creation. This can occur during the construction and operational phases.

15.2.9 Material Assets

Impacts relating to Material Assets have the potential to be impacted by other environmental aspects including Population and Human Health and Climate and Air.

15.2.10 Traffic and Transport

Impacts relating to Traffic and Transport can impact on Population and Human Health through disturbance and noise generation and potential impacts on Climate and air through GHG emissions from transport vehicles.

15.2.11 Cultural Heritage

No cross media impacts have been identified.

15.2.12 Landscape & Visual

Impacts relating to landscape and visual matters have the potential to influence other environmental factors. This includes Population and Human Health, namely visual change and impacts on visual amenity. In terms of interaction with biodiversity, the proposed development presents a very limited alteration to physical land cover. In relation to Cultural Heritage and the associated respect of the visual setting of heritage sites and monuments, the proposed development bears minimal or no impact in this regard.

Table 15-4 Potential Interaction of Significant Cross Media Impacts

Interaction	Population and Human Health		Biodiversity		Land, Soil Geology & Groundwater		Water Surface Water		Noise		Climate & Air Quality		Material Assets		Traffic		Cultural Heritage		Landscape & Visual	
	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation	Construction	Operation
Population and Human Health	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Biodiversity			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	X
Land, Soils, Geology & Groundwater					✓	✓	✓	✓	X	X	X	✓	✓	X	X	X	X	X	X	X
Water Surface Water							✓	✓	X	X	X	X	✓	✓	X	X	X	X	X	X
Noise									✓	✓	X	X	X	X	✓	✓	X	X	✓	✓
Climate & Air Quality											✓	✓	X	X	✓	✓	X	X	X	X
Material Assets													✓	✓	✓	✓	✓	✓	✓	✓
Traffic															✓	✓	✓	✓	✓	✓
Cultural heritage																	✓	✓	✓	✓
Landscape & Visual																			✓	✓

✓ Interaction

X No interaction