# 17 Major Accidents and Disasters

## 17.1 Introduction

This chapter of the EIAR presents an assessment of the likely significant adverse effects on the environment arising from the vulnerability of the proposed development at the Indaver's Waste-to-Energy facility at Duleek to risks of major accidents and/or disasters.

The Waste-to-Energy site was constructed in 2011 and is designed to recover energy from the residual fraction of non-hazardous household, commercial and industrial waste.

Indaver carried out a formal hazard identification and risk assessment (HAZID&RA) for the site, covering the risks presented by the existing activities and the new risk presented by the proposed development, specifically the new bulk storage facility (aqueous waste tank farm) at the site. In accordance with the European Commission's EIA guidance, there are two key considerations to consider in the risk assessment:

- The proposed development's potential to cause accidents and/or disasters for human health, cultural heritage and/or the environment;
- The vulnerability of the proposed development to potential disaster/accident.

The assessment of the vulnerability of the proposed development to risks of major accidents and disasters is included in this EIAR in accordance with the EIA Directive 2014/52/EU which states the need to provide:

"*a description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned*".

The HAZID&RA was drawn up to provide a systematic methodology for assessing these aspects. This is in accordance with the requirements of Directive 2014/52/EU and is structured in the following manner:

- Identification of the relevant major accidents (end events) that could arise at the site;
- Identification of the potential initiating event(s) that could give rise to each end event, including consideration of external events such as natural disasters;
- Assessment of the level of risk presented by each scenario;
- Identification of the measures that are in place, or that need to be in place, to reduce the risks and/or mitigate the impacts of these scenarios.

The underlying objective of the assessment is to ensure that appropriate precautionary actions are taken for those projects which "*because of their vulnerability to major accidents and/or natural disasters,[…] are likely to have significant adverse effects on the environment*".

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## 17.2 Assessment Methodology

### 17.2.1 General

The starting point for the scope and methodology of this assessment is that the proposed development will be designed, built and operated in line with current international best practice and, as such, major accidents will be very unlikely.

As the proposed development involves the construction of additional tankage at an existing facility which engages in the storage and handling of waste, the HAZID examined the risks associated with the existing development as well as the proposed modifications. This enabled Indaver to place the risks associated with the proposed development into context with the existing site and to ensure that the assessment covered all risks presented by the site to human health and to the environment.

A formal HAZID&RA was carried out to identify all potential accident scenarios that could arise at each area of the site where dangerous substances are stored or handled. This HAZID&RA report is presented in **Appendix 17.1** of **Volume 3** in this EIAR. Each scenario was assessed using the HAZID&RA methodology to determine its likelihood of occurrence and the severity of impact to people and the environment if it did occur. This approach gives a semi-quantitative assessment of the overall level of risk associated with each accident scenario identified. When carrying out this assessment consideration was taken of any relevant prevention or mitigation measures in place when determining the risks associated with each scenario.

Each scenario was assigned a semi-quantitative Risk Rating, based on the findings of this analysis. The Risk Ratings were then compared with the various criteria established in the risk assessment methodology in order to determine the significance of the risks associated with each scenario. This approach allowed Indaver to prioritise attention on the scenarios presenting the highest risk and to ensure that all necessary measures would be in place to prevent accidents occurring and to limit the consequences of any such accidents for population and human health and for the environment. The assessment was also to determine the risks to the proposed development from major accidents and disasters.

When assessing the risks associated with scenarios identified in the risk assessment, consideration was given to potentially vulnerable receptors in the surrounding environs, i.e. occupied areas, culturally significant developments and environmental receptors such as land, soil and water.

In carrying out this assessment, a systematic approach was adopted to identify credible scenarios and to assess the probability of occurrence for scenarios. For each scenario identified, an assessment was made of the expected significant adverse effects. Consideration was also given to the range of mechanisms by which these scenarios could arise, for both on-site and off-site initiating events, including those caused by major accidents and/or disasters.

These events were identified, evaluated and their potential contribution to the risks presented at the site were considered when drawing up the scenarios in the worksheets.

The approach to carrying out the risk assessment, and consequence modelling, for this development is consistent with the approach used by many other industrial operators with respect to major accident hazards. Although this approach is primarily used for "Seveso" establishments under the COMAH Regulations (this project is not such an establishment), the methodology provides a robust framework to identify all such major accident hazards and risks as outlined below.

### 17.2.2 Guidance and Legislation

#### 17.2.2.1 Legislative Requirements

In accordance with the requirements of the EIA Directive 2014/52/EU and associated Regulations, Indaver carried out a risk assessment for the Waste to Energy facility at Duleek, taking account of the risks associated with the existing activities on site and also the risks associated with the proposed new development. This was conducted using a systematic methodology, to assess the severities of impacts and likelihoods of occurrence for accident scenarios at the plant. This assessment examined the risks of these accident scenarios to human health and to the environment.

Recital 15 of the EIA Directive states that:

*(15) In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment. For such projects, it is important to consider their vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment. In order to avoid duplications, it should be possible to use any relevant information available and obtained through risk assessments carried out pursuant to Union legislation, such as Directive 2012/18/EU of the European Parliament and the Council1 and Council Directive 2009/71/Euratom, or through relevant assessments carried out pursuant to national legislation provided that the requirements of this Directive are met.*

It is clear from the Directive that a major accident and/or natural disaster assessment should be mainly applied to establishments under the COMAH Directive or to nuclear installations. However, the EIAR requirements must be satisfied by all developments which qualify under the EIA Directive and so the risks have been assessed and this chapter has been prepared accordingly.

#### 17.2.2.2 Guidance Documents

The Environmental Protection Agency (EPA) has published *Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2017)*, which are referred to when identifying the information requirements for this chapter.

In accordance with the provisions in Section 3.3.5 of the EPA guidance, the scoping of this chapter considers the extent to which other assessments may address some types of effects adequately and appropriately. As such, much of the information that supports this chapter of the EIAR is described in the HAZID&RA report for the development, which is referenced throughout this chapter. A copy of the HAZID&RA report is included in **Appendix 17.1** in **Volume 3** of this EIAR.

The HAZID&RA methodology is a semi-quantitative approach, as described in **Section 17.2.4.2**. This approach enables the operator to identify the relevant accident scenarios at their site and to determine the significance of the risk that each scenario presents using a calibrated ranking system. This approach also enables the operator to identify scenarios that require further assessment, as described in this chapter and in the accompanying HAZID&RA report.

This approach is comparable to the approaches used when carrying out risk assessments for e.g. Seveso establishments, ATEX risk assessments or environmental liabilities risk assessments.

### 17.2.3 Study Area

As part of the process of conducting the risk assessment, details of the surrounding environment were collated, to ensure that full consideration was given to the specific nature of surrounding environs when determining the severity of impact in the event of an accident at the site. The surrounding environment is discussed in the following sub-sections.

#### 17.2.3.1 Geology and Hydrogeology

As discussed in **Chapter 14 *Land and Soils***, the bedrock under the site is identified on the GSI website[1] as “Crinoidal peloidal grainstone-packstone” and is part of the Platin Formation (CDPLTN). The rock type is limestone and the website states that “the dominant lithology is crinoidal and peloidal grainstone, locally conglomeratic. Cherty and micritic units are also present. It is generally coarser, paler and less well-sorted than the underlying Crufty Formation. Local dolomitisation is common.”

Aquifer or groundwater vulnerability is the ease with which the groundwater may be contaminated by human activity and depends upon the aquifer’s intrinsic geological and hydrogeological characteristics. The vulnerability is determined by the permeability and the attenuation capacity of any overlying deposits.

[1] http://www.gsi.ie/

For example: bedrock with a thick, low permeability, and clay-rich overburden is less vulnerable than bedrock with a thin, high permeability, and gravelly overburden.

The aquifer beneath the site is identified as Rkd “Regionally Important Aquifer - Karstified (diffuse)”. The vulnerability of this aquifer is identified as moderate.

Two production wells were installed within the site area in June 2011. These have a sustainable yield of 600 $m^3/d$ and supply the water demand for the site. These wells are located at the south of the site, close to the R152 site boundary. There are no activities at the site, under the current operations or under the proposed new operations, which present a major accident risk to these wells. There is no pathway by which a loss of containment event identified in the HAZID could reach these wells.

The GSI map indicates that there are several wells or springs to the north of the site; these are at the nearby Irish Cement Platin site.

**Chapter 14 *Land and Soils*** of the EIAR provides a more detailed description of the geology and hydrogeology of the site and surrounding environs.

The HAZID&RA took note of the vulnerability of the surrounding geology and hydrogeology when determining the severity ratings for scenarios involving an environmental release at the site.

#### 17.2.3.2 Flora and Fauna

As discussed in **Chapter 11 *Biodiversity***, there are no environmental designations pertaining to the site footprint; in other words, the site does not form part of any proposed Natural Heritage Area (pNHA), Natural Heritage Area (NHA), Special Protection Area (SPA), Special Area of Conservation (SAC) or candidate Special Area of Conservation (cSAC), Nature Reserve, or National Park.

Referring to the NPWS map viewer, the closest such protected site to the Indaver facility is the Duleek Commons, located approximately 2 km south-west of the site. This is a drained marsh surrounded by wet woodlands and grassland. This ecological area is not designated for groundwater dependant habitat.

The closest groundwater dependant ecological area is River Boyne and River Blackwater SAC and SPA (002299) located approximately 3.2km north-west of the proposed development. However there is no direct pathway as the groundwater under the Indaver site is captured by Platin Quarry.

The stormwater system is attenuated at the point of discharge to the watercourse located at the north west corner of the site. The storm water drainage system routes the surface water from roads and hardstanding to a monitoring station. If contaminated, this is routed to the firewater retention tank; if not contaminated it is discharged via a petrol interceptor.

The River Nanny discharges to the River Nanny Estuary and Shore SPA, which is approximately 9.1 km downstream from the site. This SPA includes the Laytown Dunes/Nanny Estuary pNHA, located circa 7.3km downstream.

There are several other ecological sites in the broader vicinity of the Indaver facility. **Table 11.1** (**Chapter 11 *Biodiversity***) identifies the designated conservation areas within a 20 km radius and shows the distances to each from the proposed development.

#### 17.2.3.3 Watercourses

As discussed in **Chapter 15 *Water***, there are no significant watercourses in the vicinity of the Duleek site. The site is located inland, at a distance of approximately 10 km west of the coast.

The nearest rivers and streams are the Cruicerath stream that flows approximately 200m to the west of the site, and the Platin that flows approximately 500m to the east of the site. The main hydrological feature in the vicinity of the site is the River Nanny, which is located approximately 2km to the south of the site.

Surface water runoff from the site passes through a Class 1 petrol interceptor before being collected in an attenuation pond. The pond discharges via pump to an external drainage ditch which in turn leads to the Cruicerath stream. A detailed description of the surface water drainage system is provided in **Chapter 4**. The Cruicerath stream flows into the River Nanny. The River Nanny discharges to the River Nanny Estuary and Shore SPA approximately 11.3 km downstream of the site location. This SPA includes the Laytown Dunes/Nanny Estuary pNHA, located approximately 10km downstream.

#### 17.2.3.4 Weather Conditions

For the purposes of the HAZID&RA exercise, the meteorological parameters of most interest are ambient temperature, wind speed, atmospheric stability and rainfall. High ambient temperatures lead to increased evaporation rates from spilled materials. Low wind speeds and high atmospheric stability lead to reduced dispersion of a release, allowing higher concentrations to accumulate in the atmosphere. High wind speeds on the other hand can give rise to high angles of flame tilt in the event of a pool fire.

Dublin Airport is the closest weather monitoring station to the site and weather data for this station was obtained from Met Éireann for the period 1981-2010, which is the latest 30-year period reported on by Met Éireann. This data is shown in Table 1.1 of the HAZID&RA report.

The temperature data shows that the average daily maximum temperature varies from 8.1°C in January to 19.5°C in July. The highest temperature recorded at the station over the 30-year reporting period was 28.7°C.

Wind speed and atmospheric stability are strongly interrelated.

Greater atmospheric stability is found at low wind speeds and only certain combinations of wind speed and stability can occur. The data shows an average wind speed of 10.3 knots or 5.3 m/s.

The primary concerns with respect to rainfall is to determine whether there is the potential for flooding.

This hazard, and the measures that will be put in place to mitigate it, is described in **Appendix 15.1 *Flood Risk Assessment*** in **Volume 3** of this EIAR**.**

#### 17.2.3.5 Listed Buildings and Monuments

As discussed in **Section 12.3.1** of ***Chapter 12 Archaeology, Architectural and Cultural Heritage***, there are no recorded archaeological monuments listed in the Record of Monuments and Placed (RMP) for County Meath or in the Sites and Monuments Record (SMR) database of the Archaeological Survey of Ireland (ASI) within the proposed development site. The closest known recorded monuments to the proposed development site are a ringfort (ME027-109) in Carranstown, an embanked enclosure (ME027-078) in Carranstown/Caulstown and an enclosure (ME027-078001) and a redundant record (ME027-079) in Caulstown situated between 150m and 210m to the southeast. Refer to Table 12.1 in Chapter 12 for a full list of archaeological sites included in the RMP and SMR database within a 1.5km radius of the site.

### 17.2.4 Impact Assessment Modelling

Due to the range of materials stored at the site, the HAZID&RA examined scenarios involving flammable risks (fires and explosions), risks of acute toxic exposure to human health and risks of spills to the environment.

When assessing the impacts of accident scenarios to people in the vicinity, a consequence modelling exercise was carried out, using a range of pre-determined endpoints.

#### 17.2.4.1 Current Practice

The methodology that was used for the risk assessment is based on a technique outlined in Annex D of BS 8800: 1996, *Guide to Occupational Health and Safety Management Systems*. Similar risk assessment techniques have also been outlined by the IChemE and the US Naval Weapons Centre’s Practical Risk Analysis for Safety Management. The methodology that was used at the Duleek site is one that has been built on and developed over many years, based on operational experience of applying it at numerous industrial facilities, both in Ireland and overseas.

The approach that was adopted is consistent with guidance from the Health & Safety Authority[2]. The assessment includes the elements of risk identification, risk analysis and risk evaluation.

- Risk identification is the process of finding and recognising risks and includes the process of hazard identification.
- Risk analysis consists of determining the range of consequences and probabilities of identified events and the effectiveness of existing controls. The methods used may be qualitative, semi-quantitative or quantitative.

[2] “Guidance to Inspectors on the Assessment of Safety Reports under the COMAH Regulations 2015”

- Risk evaluation is the process of comparing estimated risk levels with pre-defined tolerance criteria to inform decisions. For the operator, risk evaluation will be about evaluating the risks that have been identified and analysed to determine whether they are tolerable.

#### 17.2.4.2 Site-specific Risk Assessment Methodology

This section describes the risk assessment methodology that was used when carrying out the risk assessment at the site. This methodology is described in more detail in the accompanying HAZID&RA report in **Appendix 17.1** of **Volume 3**.

The risk assessment was carried out by a team of personnel from Indaver and from Byrne Ó Cléirigh (external consultants). The team divided the resource recovery centre into a series of installations (i.e. areas where dangerous substances are stored or handled and which were identified as potentially presenting a significant accident scenario), each of which was assessed in turn. The assessment initially focused on the existing installations at the site. The Team then assessed the additional scenarios associated with the proposed development – this involved an assessment of the new installation(s) associated with the development and, where appropriate, reviews of the risks at existing installations, where there may be interactions with the existing site.

Each installation identified a series of scenarios, or end events, and documented them in the HAZID&RA worksheets. The potential consequences of each scenario was described and a Severity Rating was assigned, using the descriptors shown in **Table 17.1**.

**Table 17.1: Severity Ratings for Accident Scenarios**

| Severity Rating | Category Description | Health & Safety Impact | | Environmental Impact |
|---|---|---|---|---|
| | | On-Site | Off-Site | |
| 0 | Negligible | None | None | None |
| 1 | Minor | Minor injury | None | None |
| 2 | Appreciable | Multiple injuries with return to work | Discomfort | Discoloration of water or air |
| 3 | Severe | Major permanent disability | Some hospitalisation for screening | Minor short-term damage to adjacent land or water courses |
| 4 | Very Severe | Single fatality | Minor injuries | Significant short-term damage or minor long-term damage requiring clean up action |
| 5 | Catastrophic | Multiple fatalities | Major injuries or fatalities | Major incident with significant loss of species or habitat |

When assessing impacts to health & safety, consideration is given to both on-site and off-site impacts, based on the descriptors shown above, to determine the appropriate Severity Rating. The range of impacts covered by this scale enables

Indaver to assess and rank the impacts of a wide range of scenarios, from relatively minor events to major accidents.

To support this assessment, a representative selection of credible worst-case scenarios was identified and consequence modelling was carried out to calculate the impacts of these scenarios to the surrounding area. The consequence modelling endpoints that were used in this assessment are described in the accompanying HAZID&RA report.

Once the various accident scenarios for a particular installation were identified and Severity Ratings assigned to each, the Team then examined the various initiating events which could potentially give rise to each scenario and the details were set out in the Risk Assessment Register (RAR) sheet. The potential initiating events which were considered included, inter alia, mechanical failure, human error, control equipment failure, as well as external events such as domino effects from an external event or a disaster such as flooding or earthquake. A copy of the RAR worksheets is included in the HAZID&RA report.

Each initiating event – end event combination was assigned a Frequency Rating by the team, based on the descriptors shown in **Table 17.2** below.

**Table 17.2: Frequency Ratings for Accident Scenarios**

| Frequency Rating | Descriptor | Frequency Range per Annum |
|---|---|---|
| 1 | Virtually impossible | < 1 × 10-8 |
| 2 | Improbable | 1 × 10-8 to 1 × 10-5 |
| 3 | Unlikely | 1 × 10–5 to 1 × 10-3 |
| 4 | Infrequent | 1 × 10-3 to 0.1 |
| 5 | Occasional | 0.1 to 10 |
| 6 | Frequent | > 10 |

Numerical Risk Ratings were determined for each scenario identified in the course of the exercise using the following equations:

$$R_H = S_H \times L$$

$$R_E = S_E \times L$$

Where:

RH is the Risk Rating with respect to health and safety

RE is the Risk Rating with respect to the environment

SH is the Severity Rating with respect to health and safety

SE is the Severity Rating with respect to the environment

L is the Likelihood Rating for a specific initiating event – end event combination.

The significance of the Risk Rating for each scenario was assessed using the matrix shown in **Table 17.3**.

**Table 17.3: Matrix of Risk Ratings**

| Risk Rating | | Severity | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| Frequency | 1 | 1 - Trivial | 2 - Trivial | 3 - Trivial | 4 - Trivial | 5 - Minor |
| | 2 | 2 - Trivial | 4 - Trivial | 6 - Minor | 8 - Minor | 10 - Moderate |
| | 3 | 3 - Trivial | 6 - Minor | 9 - Moderate | 12 - Substantial | 15 - Priority |
| | 4 | 4 - Trivial | 8 - Minor | 12 - Substantial | 16 - Priority | 20 - Priority |
| | 5 | 5 - Minor | 10 - Moderate | 15 - Priority | 20 - Priority | 25 - Priority |
| | 6 | 6 - Minor | 12 - Substantial | 18 - Priority | 24 - Priority | 30 - Priority |

A Risk Reduction Register (RRR) was then completed for each scenario on the back of this assessment. This was used to set out any specific scenarios or locations at the site where the HAZID&RA Team identified or recommended additional risk reduction or mitigation measures. When making these recommendations, consideration was given to the risk level associated with each scenario using the criteria set out in **Table 17.4**.

**Table 17.4: Significance of Risk Ratings for Accident Scenarios**

| Risk Rating | Risk Level | Action and Timescale |
|---|---|---|
| ≤ 4 | Trivial | Generally, no action is required for scenarios with such low risk levels and if so there would be no need for detailed working to demonstrate ALARP (i.e. are As Low As Reasonably Practicable). |
| 5 to 8 | Minor | No additional controls are required in most cases. Consideration may be given to a more cost-effective solution or improvement that imposes no additional cost burden. Monitoring is required to ensure that controls are maintained. |
| 9 to 11 | Moderate | Efforts should be made to reduce the risk, but the cost of prevention should be carefully measured and limited. Risk reduction measures should be implemented within a defined time period.<br>Where a moderate risk is associated with a scenario whose consequences are in the category of Very Severe or Catastrophic (Severity Rating 4 or 5) further assessments may be necessary to establish more precisely the likelihood of harm as a basis for determining the need for improved control measures. |
| 12 to 14 | Substantial | The activity should not be started until the risk has been reduced. Considerable resources may have to be allocated to reduce the risk. Where the risk involves a current activity, urgent action should be taken. |
| ≥ 15 | Priority | The activity should not be started or continued until the risk has been reduced. If it is not possible to reduce risk, even with unlimited resources, this activity must be prohibited. |

# 17.3 Receiving Environment

## 17.3.1 Natural Disasters / External Impacts

In carrying out the risk assessment, the team considered worst case scenarios, including scenarios involving complete loss of containment from a vessel or tank, or scenarios involving a fully developed fire. The risk assessment worksheets in the HAZID&RA report show that a variety of initiating events was considered when determining the probabilities of occurrence for these scenarios. As part of this assessment, consideration was also given to the potential for an accident to arise at the site as a result of a natural disaster or other external impact. These are discussed in the following sub-sections.

### 17.3.1.1 Earthquakes

The School of Cosmic Physics (part of the Dublin Institute for Advanced Studies) was consulted regarding the risks posed by seismic activity in Ireland. The School has had a seismic network in operation in Ireland since 1978. They have indicated that Ireland is seismically very stable and that there is nothing to suggest that this will change in the coming millennia.

The HAZID&RA report includes a series of maps (Figures 2.1 to 2.3) showing earthquake incidents and earthquake risk which were developed by The *Seismic Hazard Harmonization in Europe* (SHARE) project, comprising eighteen European partner institutions.

- There is a map with incidents of earthquakes in Europe between 1900 and 2006. This shows that there were no earthquakes exceeding the threshold of M3.5 recorded in Ireland during that time period.
- The maps of earthquake hazards show that the risk of an earthquake in Ireland is amongst the lowest in Europe.

These maps are contained in Section 2.4.1 of the HAZID&RA report.

Based on these considerations, the risk associated with earthquakes or ground movement at the site is extremely remote. If this did occur, there would be the potential for loss of containment of materials from vessels. These loss of containment events are identified and assessed in the HAZID&RA worksheets. It was considered that the risk from an earthquake or ground movement would have a negligible contribution to the probabilities of occurrence of these scenarios.

### 17.3.1.2 Flooding

Referring to the meteorological data for Dublin Airport in the HAZID&RA report, in the worst-case rainfall event, the highest quantity of rainfall that could fall onto a bund area would be 73.9 mm in 24-hours. Any build-up of water in the bunds can therefore be easily managed by Indaver operators by allowing the rainwater to drain via oil-water separators, in accordance with normal operating procedures at the site.

A flood risk assessment (FRA) report was prepared by McElroy Associates (MEA), refer to **Appendix 15.1** of **Volume 3**.

**Section 15.3.1.2** of **Chapter 15** ***Water***, summarises the conclusions of the report whereby the site is minimal risk of groundwater or pluvial flooding; not at risk to fluvial or coastal/tidal flooding.

#### 17.3.1.3 Power Failure

There are no accident scenarios identified at the site which would be associated with a power failure. There will be no materials at the site which are unstable or which require a power supply to ensure that they are stored or handled safely, e.g. materials requiring a temperature controlled environment.

The site has an uninterruptible power supply (UPS) system and emergency diesel generator to provide power in the event of a power cut. This means that Indaver retains the facility to activate the fire protection systems in the event of a disruption to the electrical supply to the site.

If a power failure occurred to a key item of plant or equipment at the same time as potentially hazardous materials were being delivered to the site (e.g. a delivery of aqueous ammonium hydroxide to the storage tank), the transfer would be halted for the duration of the loss of power event.

Based on the controls that will be in place it was considered that there was no credible risk of a major accident scenario associated with a power failure to the site.

#### 17.3.1.4 Aircraft Impact

The closest major airport to the Duleek site is Dublin Airport. **Figure 17.1** and **Figure 17.2** show the plot of the Public Safety Zone (PSZ) for this airport. This is taken from a report[3] by ERM (Environmental Resources Management) Ireland Ltd (2003), which was commissioned by the Department of Transport and the Department of the Environment and Local Government.

The aim of these PSZs was to protect people on the ground from the risk of an aircraft crash by using land use planning controls on developments in the vicinity of airports. Essentially a PSZ is used to prevent inappropriate use of land where the risk to people is the greatest. The two plots show the PSZs based on the (then) current airport configuration and on a proposed configuration incorporating expanded facilities at the airport.

The plots show that the zones do not extend to the Duleek site. The Duleek site is located more than 10km outside of the PSZ contours. As such the risk of an aircraft impacting the Duleek site is therefore considered to be extremely remote and therefore was not considered as a credible scenario in the HAZID&RA.

[3] Public Safety Zones: Cork, Dublin and Shannon Airports, ERM, June 2003 (Draft) on behalf of Department of Transport and Department of Environment & Local Government.

**Figure 17.1: Proposed Public Safety Zones around Dublin Airport (existing runways) (Source: ERM)**


Based on Ordnance Survey Ireland Permit No. 7643. © Ordnance Survey Ireland & Government of Ireland

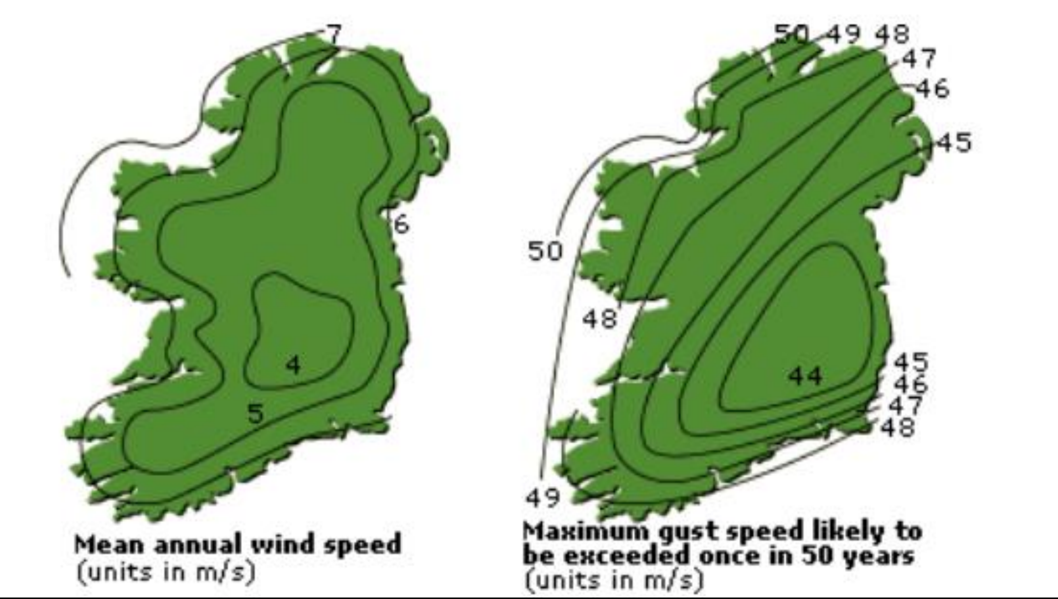
**Figure 17.2: Proposed Public Safety Zones around Dublin Airport including proposed runway 10L/28R (Source: ERM)**


Based on Ordnance Survey Ireland Permit No. 7643. © Ordnance Survey Ireland & Government of Ireland

### 17.3.1.5 High Wind Speeds

Met Éireann has produced a map showing the estimated maximum gust speeds for a 50-year return period in Ireland. This is reproduced here as **Figure 17.3**.

**Figure 17.3: Mean and maximum wind speeds (Met Éireann)**




Typical maximum gust speeds for Ireland range up to 50 m/s depending on the location of the site. For Duleek, the estimated speed for this return period is c.44 m/s.

The historical data for the Dublin Airport weather station shows the highest 10-minute mean wind speed over the period to be 55 knots (102 km/h), with a maximum gust of 80 knots (148 km/h).

No credible accident scenario resulting from high wind loading was included as an initiating event by the HAZID&RA Team.

### 17.3.1.6 Extremes in Ambient Temperature

The highest ambient temperature at the site (based on a 30-year return period) would be of the order of 28.7°C. There are no scenarios envisioned in which high ambient temperatures could give rise to an accident scenario at the site.

The data shows that the lowest temperature recorded during this period was -12.2°C. The only hazards identified which would be presented by extreme low temperatures are the risk of a vehicle collision at the site due to formation of ice on the ground and the risk of freezing in the water main. The potential for a traffic accident exists at all times and is included as an initiating event for relevant scenarios in the HAZID&RA. While there may be an increased risk in the event of heavy icing on site, this would be mitigated by the measures that Indaver would put in place. Indaver ensures that only operators with appropriate waste collection permits are allowed to bring vehicles onto the site.

Furthermore, all vehicles arriving on site are checked at security and Indaver provides induction training for all drivers operating at the site. The induction training is provided to new drivers and renewed every year to all drivers. Indaver maintains records of this training.

There is also a speed limit on site. Indaver also monitors ground conditions on site in areas accessed by vehicles during freezing temperatures and will salt/grit areas if required to reduce the risks associated with icy conditions. Indaver also supervises all deliveries to the tipping hall and a Tipping Hall Operator guides the driver to ensure that the deliveries are carried out in a safe and controlled manner.

Indaver mitigates against the risk of water freezing in the water main on site by ensuring that it was designed to meet the necessary standards and the requirements of the Fire Certificate and those of the insurance company. The ring main is underground and any chambers for hydrants are insulated and heat traced.

As a result, no credible accident scenario resulting from extremes in ambient temperature was included as an initiating event by the HAZID&RA Team.

#### 17.3.1.7 Lightning

Referring to guidance from the UK HSE, it advises that the use of BS 62305 is the expected standard for lightning protection at hazardous industries[4]. The HSE states that the likelihood of a major accident being initiated by a lightning strike at a well-designed and maintained hazardous installation is, therefore, low so Inspectors must act proportionately to focus on those major hazard installations where reasonably foreseeable risk remains.

In other guidance, the UK HSE notes that the probability of an accident arising as a result of lightning strike at a typical facility involved in the storage of flammable liquids is extremely remote, with a probability of $1 \times 10^{-7}$ per annum[5]. This guidance is for activities involved in the storage and handling of materials which would present a greater fire hazard than the materials at the Indaver facility.

All areas of the site which are used for the storage and handling of dangerous substances have been assessed under BS EN/IEC 62305 and, where required, are fitted with lightning protection systems which are designed and installed in accordance with same. The proposed new development will also be fitted with appropriate earthing protection.

Based on the measures that will be in place and on the guidance from the UK HSE, it was considered that the risk that a lightning strike could initiate a major accident was found to be negligible.

### 17.3.2 Major Accident Hazards from Offsite Establishments

The Indaver Duleek site is located to the northeast of Duleek village.

[4] http://www.hse.gov.uk/foi/internalops/og/og-00044.htm
[5] http://www.hse.gov.uk/comah/sraghfl/highly-flammable-liquids.pdf

The maps of the site and surroundings illustrate that there are large separation distances between the installations at the Indaver Duleek site and any neighbouring facilities which could have any potential to act as an initiator for an accident at the site. The R152 runs along the south / east boundary of the site and there are several minor developments along this stretch of road (DSG Stores, Paul Kavanagh VTN, Platin Motor Factors). These closest of these is over 200 m from the production buildings and none of these developments present any risk of initiating an accident at the Duleek plant.

There are no COMAH establishments[6] in the vicinity of the Indaver Duleek site. The closest major industrial development is the Irish Cement Factory Platin. There are large separation distances between the installations at Indaver and at Irish Cement; the closest buildings are over 400 m away from each other.

Prior to the construction of the Indaver site, discussions were held with Irish Cement to determine whether there is any risk to the Duleek site as a result of the blasting activities carried out at the quarry. This is carried out by Irish Cement in a controlled manner, in accordance with the conditions of their licence from the EPA. At the time of these discussions, it was noted that Irish Cement's licence specified a peak particle velocity limit of 12 mm/s for ground-borne vibration at the nearest noise sensitive location. The Indaver site is located at a similar distance from the quarry as the sensitive location identified in the licence and so it was anticipated at the time of construction of the Indaver site that the worst-case vibration levels at the foundations of the buildings would be of the order of 12 mm/s. This assumed that geological ground conditions are consistent between the Irish Cement site and receptor locations around the quarry site. The latest version of the Irish Cement Industrial Emissions Licence (P0030-05) retains the 12 mm/s limit, which applies now to three locations around the perimeter of the site.

In addition, to reflect the presence of the quarry in the vicinity, the building foundations at the Indaver site are designed to accommodate this potential seismic activity. On this basis it was anticipated prior to the commencement of construction of the site that there would not be any cosmetic or structural damage at Indaver as a result of the activities at Irish Cement. This has since been borne out and there has been no evidence of any such damage over the years of operation at Duleek.

## 17.4 Characteristics of the Proposed Development

The proposed development involves the construction of new installations at the existing Indaver site in Duleek, with other changes to increase the throughput at the site.

With respect to potential major accident hazards, the key developments are as follows:

[6] Establishments to which the Control of Major Accident Hazards Regulations (SI 209 of 2015) apply

- Construction of a new tank farm for aqueous waste storage prior to treatment. The tank farm will facilitate an increase from 235,000 tpa to 250,000 tpa capacity at the site. this will involve the construction of a tank farm with 2 no. 300 $m^3$ tanks for aqueous waste storage and an upgrade to the tanker unloading area. The tanks will be housed in a bund, in accordance with good practice, and will be maintained under a nitrogen blanket.
- Construction of a hydrogen generation unit. This will be rated for up to 10 $MW_e$ power generated on site in 4 no. modular units. The plant will be capable of generating over 160 tpa of hydrogen gas for injection to the gas network and for refuelling hydrogen-compatible vehicles. There will be a maximum of 2 tonnes of hydrogen storage on site.

The HAZID assessment of the site examines the risks associated with the existing and the proposed development at the site. This is described in more detail in the HAZID&RA report in **Appendix 17.1 *HAZID&RA Report***.

## 17.5 Likely Significant Effects

### 17.5.1 "Do Nothing" Scenario

The site already engages in the storage and handling of dangerous substances, as noted in this report. The introduction of the new plant and facilities at the site will introduce new hazards, associated with the increased storage and handling of aqueous wastes at the tank farm and the introduction of the hydrogen generation unit. The current level of risk presented by the existing activities at the site would continue to be managed by Indaver in accordance with good practice.

### 17.5.2 Construction Phase

There are no special or unique hazards associated with the construction of the plant on this particular site that would not be encountered on any typical construction site for an industrial building. None of the new hazards identified in the risk assessment worksheets for the new bulk tank and its associated facilities could arise during the construction phase of the project. However, the construction activities could potentially present a risk of acting as an initiator to an accident at the existing site, e.g. where mis-operation of heavy lifting equipment causes damage to nearby plant.

As discussed in **Section 5.14** of **Chapter 5 *Construction Activities***, a Health and Safety Plan will be prepared which will address health and safety issues from the design stages through to the completion of the construction and maintenance phases as required by the Safety, Health and Welfare at Work (Construction) Regulations 2013.

The Construction and Environmental Management Plan (CEMP) included in **Appendix 5.1** of **Volume 3** of this EIAR, summarises the environmental strategy that will be adopted to ensure all risks are mitigated. The CEMP sets out the mechanism by which environmental protection is to be achieved.

The effective implementation of the CEMP will help to reduce the risks to the environment associated with the construction phase of the project.

This will ensure that the potential risks of major accident and/or disaster are identified, avoided and mitigated, as necessary.

The CEMP also includes the development of a Construction Waste Management Plan (CWMP) to ensure that waste arising during the construction of the site will be minimised and that wastes will be managed and disposed of in accordance with regulatory requirements, ensuring that optimum levels of reduction, re-use and recycling are achieved.

## 17.5.3 Operational Phase

The risk assessment team examined 144 scenarios at the site, using the methodology described in Section 17.2.4.2 above. Of these, 133 scenarios were found to present credible accident hazards and they were each assigned a Severity Rating and a Frequency Rating, as described above.

The distributions of risk ratings, based on the risks presented to human health and to the environment, are shown in **Figure 17.4** and **Figure 17.5**.

**Figure 17.4: Accident Scenario Risk Ratings for Human Health**

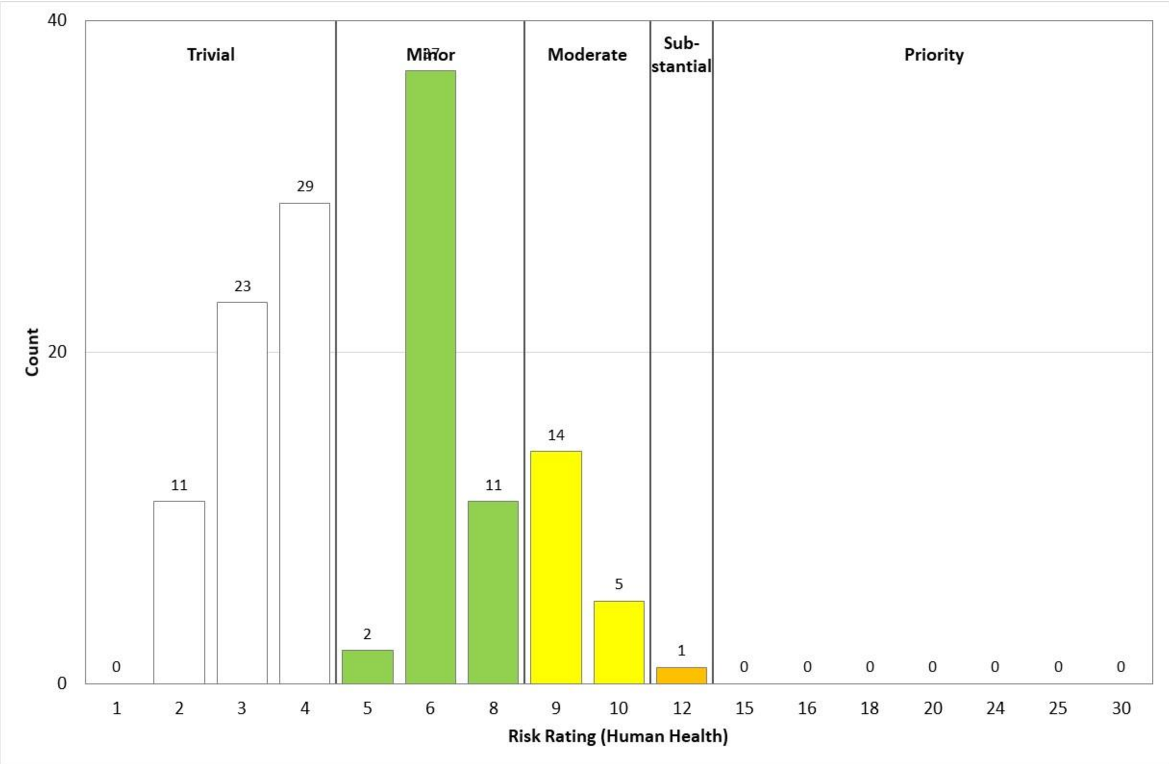
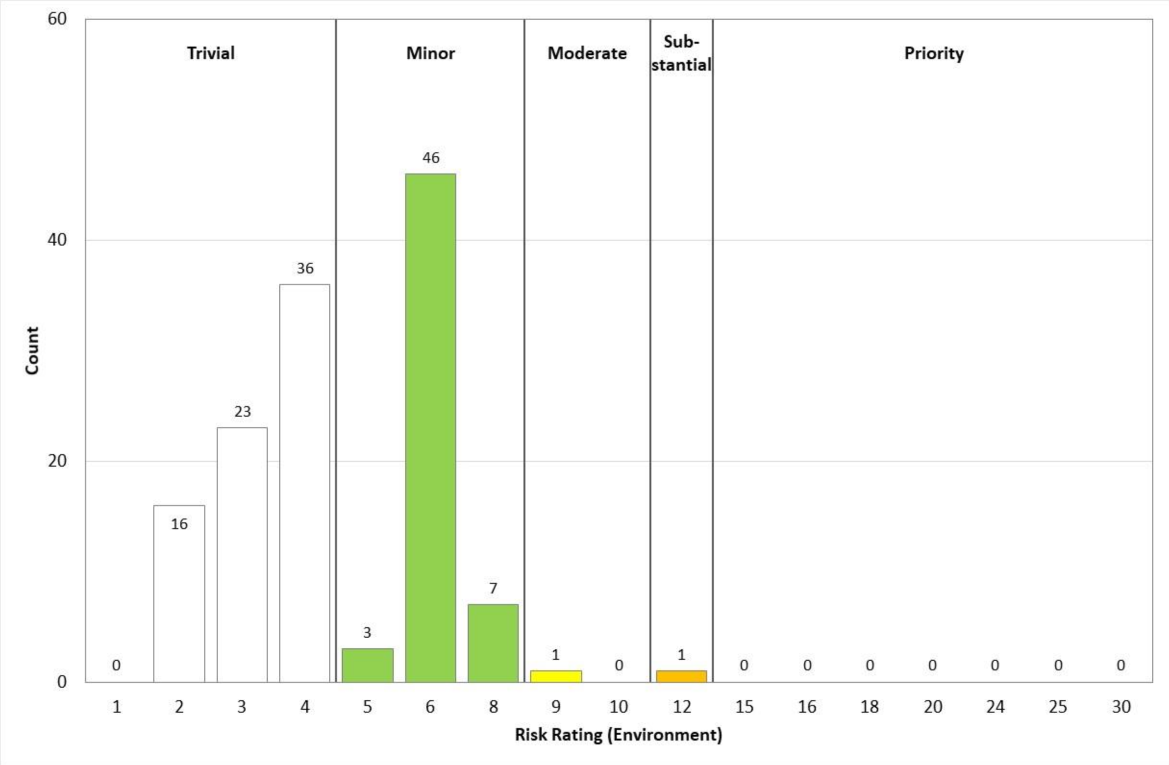


**Figure 17.5: Accident Scenarios Risk Ratings for Environmental Impacts**




These two graphs reflect the risks presented by all major accident scenarios identified at the site, both under the *current* operations and under the *proposed new* development. The scenarios identified in the HAZID&RA report involve accident scenarios such as fires and loss of containment events involving materials classed as hazardous to human health and/or the environment. The most significant scenarios identified in the report are summarised below. These scenarios have been split into two sub-headings, to distinguish between accident scenarios identified for the existing site infrastructure and scenarios identified for the proposed development.

### *Existing scenarios*

- Bunker fire.
- Loss of containment of aqueous ammonia from storage tank.

### *Scenarios associated with proposed new development*

- Fire at aqueous waste tank farm.
- Fire / explosion at hydrogen generation unit.

The effects arising from these scenarios would involve direct impacts to human health and/or to the environment. The assessment also considered whether there would be any risk that an accident scenario at Indaver could initiate an accident off site.

These scenarios are discussed in more detail in the following subsections. Discussion of the protective measures that are in place, and of the measures that will be put in place, to ensure that the risks are as low as practicable, is provided in **Section 17.6.2.**

#### 17.5.3.1 Major Accident Scenarios at Existing Plant

***Bunker Fire***

This scenario received a Severity Rating of 3 for both Human Health and for the Environment and a Likelihood Rating of 4. This reflects the scenario of a fully developed bunker fire at the facility. As such the risk mitigation measures to protect against this scenario were examined in more detail to ensure that all necessary measures have been put in place.

The combined effects of all three phases of a bunker fire on human health (i.e. from an initial spot fire, to escalation within the bunker, to a fully developed bunker fire scenario) have been examined and are described the report in **Appendix 17.1** ***HAZID&RA Report***. Based on this assessment, the calculated values for the PCDD/F contribution made by the Indaver facility were found to be insignificant. There is no significant impact to the soils and/or the food chain from dioxins released in the event of accidental fires in the solid waste bunker at Indaver.

In addition to the smoke plume, the fire would result in thermal radiation being emitted to the surroundings. The credible worst case fire scenario is the escalation event, involving a fully developed fire at the bunker; it is assumed that the structure of the building could be damaged by the fire and so no shielding effect would be provided. The thermal radiation contours in the HAZID&RA report show that there are no offsite impacts from the bunker fire scenario, even in the case of the fully developed bunker fire.

The on-site impacts would be mitigated by the emergency response arrangements that are in place at the site. As discussed in the HAZID&RA report, there are controls in place to protect against this scenario.

***Loss of containment of aqueous ammonia from storage tank***

This scenario involves a major release from the aqueous ammonia storage tank at the Indaver Duleek site. It was identified in the HAZID that, in the event of a loss of containment of aqueous ammonia, there is the potential for the evolution of ammonia gas to atmosphere.

The modelling results for the credible worst case scenario, involving a complete loss of containment from the aqueous ammonia tank, with evolution of ammonia gas to atmosphere, shows that the maximum distances to a dangerous dose would be 78 m, for a release in typical atmospheric conditions and would be 285 m for a release in calm conditions.

The effects of loss of containment events such as this are assessed in the HAZID report in **Appendix 17.1**.

This report also describes the controls in place to mitigate the risks associated with this scenario – to reduce the probability of occurrence and to mitigate the impacts to human health and to the environment.

#### 17.5.3.2 Fire at proposed aqueous waste tank farm

This scenario involves a major release of aqueous solvent waste, with ignition to give rise to a pool fire on site. The tanks are fitted with shields in place around the perimeter of the tank walls, which will help to minimise the risks associated with a release outside the bund due to, e.g. overjetting or overtopping of the bund wall. In the event of a major release, the size of the resulting pool of liquid will be restricted by the installation of a bund at the tank.

In the event of a major release, the risk of ignition is low when compared with other bulk storage facilities, e.g. in solvent or petroleum service, as the materials in the tanks are aqueous solutions, where the water content is in excess of 90%. Nonetheless a scenario involving a bund fire was considered credible and modelling conducted to determine the impacts to the surrounding area.

The modelling results show that, in the credible worst-case event of a full bund fire, there would be no impacts off site. The tank farm is located at the site boundary to the north of the site and so, in the event of a full bund fire, there would be high levels of thermal radiation at the boundary. However, the modelling also shows that heat flux decreases rapidly with distance, to a level of 4 $kW/m^2$ at a distance of 22 m from the bund.  There are no vulnerable offsite receptors within this range.

#### 17.5.3.3 Fire / explosion at proposed hydrogen generation unit

The credible worst case scenario in this area of the site involves a major release following catastrophic failure of the hydrogen storage vessel, resulting in overpressures to the surrounding area.

The hydrogen storage vessel operates at high pressure and so, in the event of an explosion, this would result in high levels of overpressure in the immediate vicinity.

The nearest off-site receptor is the R152 road, which runs to the south of the site. At its closest point, this is located at a distance of approximately 85 m from the hydrogen plant. In the worst-case scenario, the maximum overpressures at the roadway would be of the order of 50 mbar.  Exposure to this level of overpressure does not present a risk to people.

## 17.6 Mitigation Measures and Monitoring

### 17.6.1 Construction Phase

As noted in **Section 17.5.2**, none of the hazards identified in this report arise during the construction phase of the development.

The new accident scenarios associated with the new plant will only arise during the operational phase of this plant. However, the construction activities could present a risk of acting as an initiator to an accident scenario at the existing plant.

A Construction and Environmental Management Plan (CEMP) will be in place to ensure that the construction is carried out in a safe manner with regard to safeguarding the environment from potential incidents on site. The CEMP also sets out the Construction Traffic Management Plan which will be finalised and implemented by the Contractor. The CEMP is described in **Appendix 5.1** of **Volume 3** of this EIAR.

Risk assessment is an integral part of the CEMP. Furthermore, the appointed PSCS (Project Supervisor Construction Stage) will ensure that the interaction of different activities at the site is managed safely so as not to present any unacceptable risks. The CEMP will also incorporate the development of an Incident Response Plan (IRP) to ensure that, in the unlikely event of an incident, response efforts are prompt, efficient, and appropriate. The objectives of the IRP will be to:

- Ensure the health and safety of workers and visitors along the site.
- Minimise any impacts to the environment and ensure protection of the water quality and the aquatic species dependent on it.
- Minimise any impacts on properties, services etc.
- Establish procedures that enable personnel to respond to incidents with an integrated multi-departmental effort (including a link to the existing on-site Emergency Plan) and in a manner that minimises the possibility of loss and reduces the potential for affecting health, property, and the environment.
- The CEMP also sets out provisions for traffic management during the carrying out of the construction works.

The CEMP will include provision for continuous inspections, auditing and monitoring of the construction works. The Site Environmental Manager (SEM) will draw up a schedule of monitoring, which will set out roles and responsibilities for monitoring and reporting the works. In the event that the monitoring results indicate that the works are not being carried out in accordance with the contractual requirements, the SEM is responsible for initiating and reporting on the corrective actions to be implemented.

The SEM and the Construction Manager will also carry out quarterly audits to ensure that the Contractor engaged in carrying out the works is successfully meeting all environmental commitments / requirements under the CEMP.

The effective implementation of the CEMP will help to reduce the risks associated with the construction phase of the project in terms of the environmental effects. The PSCS (Project Supervisor Construction Stage) will monitor performance against the CEMP to ensure that it is adhered to throughout the process.

### 17.6.2 Operational Phase

In assessing the risks presented at each installation at the site (both existing and proposed installations), the HAZID&RA noted a range of measures that are in place, or will be put in place for the new development, to mitigate the risks associated with the accident scenarios that were identified.

For those areas identified as presenting a credible risk of a significant accident scenario, the scenarios were documented and assessed in the HAZID&RA worksheets, which are included in Appendix 3 to the HAZID&RA report (**Appendix 17.1** in **Volume 3** of this EIAR). The worksheets were also used to document the risk reduction and mitigation measures to protect against these scenarios.

Based on the findings of the HAZID exercise, there were no scenarios identified which presented a Priority Risk (see **Table 17.3**). There was one scenario identified as presenting a Significant Risk; this is an existing scenario involving a fire in the bunker area.

In addition to the bunker fire scenario, several other accident scenarios were also considered for further assessment. These present lower risks but broaden the assessment of credible worst-case scenarios that could arise at the Duleek site.

For these scenarios, the risk assessment team reviewed the protection systems to ensure that all necessary measures would be in place to protect against these scenarios. Full details are contained in the HAZID&RA report in **Appendix 17.1** in **Volume 3** of this EIAR.

Details of the measures that will be put in place to reduce and mitigate the risks associated with the key scenarios associated with the proposed development are discussed in the following sub-sections:

***Risk Reduction and Mitigation Measures at New Aqueous Waste Tank Farm***

- Tanks will be fully bunded, in accordance with the 110% rule and 25% rule (i.e. bund is large enough to retain at least 110% of the volume of the largest tank and 25% of the total inventory stored at the bund).
- Tanks will be fitted with shielding to protect against the risk of a release outside of the bund due to tank failure.
- Tanks will operate with a nitrogen blanket on the vapour space, to protect against the potential for evolution of flammable vapours from the liquid surface.
- Welded pipelines to minimise the use of flanged connections.
- Preventative maintenance regime to ensure integrity.
- Design to incorporate measure to protect against siphoning of the tank contents in the event of line failure.
- Permit to work system to control potentially invasive works on site.
- Impact protection at tank farm and at tanker loading area.

- Deliveries will be manned activities carried out by trained operators.
- Hoses will be inspected prior to transfers taking place.
- Visual inspection of tankers prior to acceptance on site.
- Overfill protection system on tanks (level gauges, level switches).
- Personnel protective equipment (PPE) for operators involved in carrying out deliveries, as required.
- Contents of the aqueous waste tank are dilute (>90% water), thereby reducing the fire hazard.

***Risk Reduction and Mitigation Measures at New Hydrogen Plant***

- Interlocks on system, to enable a leaking section of line to be isolated, reducing the potential quantity released to atmosphere.
- Pressure reduction at connection for vehicle fuelling.
- Siting of facility and separation distances to other plant, equipment, buildings, etc. in accordance with NFPA 55.
- Preventative maintenance system on plant and equipment, to ensure integrity and fitness for purpose.
- Forced ventilation at indoor area of plant, to prevent risk of hydrogen accumulation at ceiling level.
- Impact protection on hydrogen plant.
- Speed limit in place on site.
- Road tanker movements supervised by trained Indaver operator.
- Visual inspection of road tankers prior to acceptance on site.
- Transfer hoses inspected prior to use.
- ATEX zoning, with control of ignition sources.

These include measures to reduce the probability of an accident scenario developing (risk prevention) and measures to reduce the consequences if an accident did occur (risk mitigation). The measures protect against the conditions arising under which an accident could occur, enable rapid detection and response and protect against the risk of environmental contamination.

With these measures in place, the HAZID&RA found that Indaver would have all necessary measures to in place at the bunker, throughout all phases of the operation. As such the risks associated with this scenario were considered to be ALARP (as low as reasonably practicable).

## 17.7 Cumulative Effects

In the context of a discussion of cumulative effects, consideration was made of the risk that a major accident arising at the Indaver site could act as an initiator of a further accident. Consideration was also made of the risk that a major accident elsewhere could give rise to a major accident at the site.

This consideration applies to on-site cumulative effects (between the existing site and the proposed development) or between the Indaver plant and a neighbouring site.

The consequence modelling results in the HAZID&RA report show the extent of the impacts from accident scenarios arising at Indaver. When considering the potential for cumulative effects, in which a fire or explosion could damage other plant or equipment, the following endpoints have been used:

- Thermal radiation of 8 $kW/m^2$: This is the threshold value reported in IP19[7] at which protective cooling water may be required to prevent escalation of a fire event to exposed items of plant and equipment.
- Thermal radiation of 25 $kW/m^2$: This heat flux is reported in the Green Book[8] as being sufficient to cause Damage Level 2 in steel structures (serious discolouration of surface, peeling off of paints and/or appreciable deformations of structural elements).

Referring to the model results in the HAZID&RA report (**Appendix 17.1**), for most of the fire scenarios identified in the report, there are no significant offsite consequences and the contour plots for these scenarios are contained within the site footprint. The on-site impacts of these scenarios are mitigated by the means of the emergency response measures that Indaver has in place.

The scenario identified as giving rise to the highest levels of thermal radiation off-site is the bund fire scenario at the aqueous waste tank farm. Due to the proximity of the tank farm to the site boundary, the scenario of a full bund fire would result in elevated levels of thermal radiation at the boundary. The modelling also shows that heat flux decreases rapidly with distance, to a level of 4 $kW/m^2$ at a distance of 22 m from the bund. There are no vulnerable off-site receptors within this range.

In addition to consideration of the effects to existing infrastructure, it is also noted that there are several planned developments in the vicinity. The potential for cumulative effects as a result of the construction and operation of the proposed development and the following projects has been assessed where relevant in the following sections.

### 17.7.1 Irish Cement Ltd. (Planning Ref. LB150375 and Planning Ref. PL17.PA0050)

The development (Planning Ref. LB150375) will consist of the installation of a Flue Dust Portland Cement Silo at Kiln 3. The development will include the provision of a silo of circa 40m in height and 12m in diameter, together with

[7] "Model Code of Safe Practice Part 19: Fire precautions at petroleum refineries and bulk storage installations" (Energy Institute)

[8] "Methods for the determination of possible damage to people and objects resulting from releases of hazardous materials (CPR 16E)" (TNO)

filter, access gantries, bucket elevator and truck loading facility all on an application site of circa 0.75 hectares located within Platin Cement Works. Permission was granted in June 2015. The current timeline for construction is unknown.

The planning application (Planning Ref. PL17.PA0050) was for a 10-year permission to facilitate further replacement of fossil fuels and allow for the introduction of alternative raw materials in the manufacturing of cement at Platin Cement Works, Platin, Co. Meath. The proposed development is for the use of an additional 480,000 tonnes per annum of alternative fuels and alternative raw materials. Permission was granted in April 2018. The current timeline for construction is unknown.

As noted in **Section 17.3.2**, the distance between the closest buildings at Indaver and at Irish Cement is more than 400 m. The new developments at Irish Cement would therefore be well outside the hazard distances calculated for any of the scenarios identified in the HAZID. There is no risk to either of the planned developments at Irish Cement arising from the activities or the planned activities at Indaver.

In conclusion, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from major accidents or disasters associated with the Indaver Site Sustainability Project in combination with the projects above

### 17.7.2 SSE Generation Ireland Ltd. (PL17.303678)

This planning application refers to an air-insulated switchgear 110kVand for a transmission substation (Ref. 17.303678). The substation application was submitted to An Bord Pleanála as a Strategic Infrastructure development in February 2019 and was granted permission in January 2020.

It is noted that the substation scheme above appears to be an enabling component for a separate planning application for an open cycle gas turbine (OCGT) power plant, which was submitted to Meath County Council and permission granted in July 2019, but was subsequently appealed to An Bord Pleanála, where it was ultimately refused in December 2019. The OCGT plant therefore does not have a grant of planning.

Given the grant of permission received by the 110kV substation there is potential for this scheme to proceed as a standalone project.

The proposed site for development of this facility is located to the south of the R152. As noted previously, there are no significant impacts at this road from the major accident scenarios. This in turn also means that there are no significant impacts at the site of the SSE project, which is located across the road from the Indaver site.

In conclusion, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from major accidents or disasters associated with the Indaver Site Sustainability Project in combination with the project above.

### 17.7.3 Highfield Solar Ltd. (Planning Ref. PL17.303568) and 17.248146

These two applications (for a scheme titled 'Garballagh Lower Solar Farm') comprise an application for the development of a Solar Farm (17.248146) and a separate application for an electrical substation and associated 110kV and MV infrastructure required (17.303568) to connect the ground-mounted solar PV generation to the electrical transmission system, including underground cabling and all associated ancillary site development work.

Both applications were granted planning permission by An Bord Pleanála (in March 2019 and July 2019, respectively). Construction is underway; however, the estimated opening date is unknown.

It is reasonable to assume that this scheme will be constructed and operational prior to the development of the proposed Site Sustainability Project.

The new developments at Highfield Solar are at a much further distance from Indaver than the developments at Irish Cement. There is no risk to either of the planned developments at Highfield Solar arising from the activities or the planned activities at Indaver.

In conclusion, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from major accidents or disasters associated with the Indaver Site Sustainability Project in combination with the projects above.

Finally, taking the Indaver Site Sustainability Project in in combination with the five projects listed above it is considered that there is no potential for any significant negative direct or indirect cumulative impact to arise from major accidents or disasters, given the distance of these permitted projects and the proposed Site Sustainability Project.

## 17.8 Residual Effects

### 17.8.1 Construction Phase

The accident scenarios discussed in this chapter of the EIAR mainly relate to hazards associated with the storage and handling of dangerous substances or the storage and handling of waste at the site. As such, these hazards will not arise at the new plant until after the construction phase has been completed and the operational phase has commenced.

As the construction works for the new plant will take place on an operational site, there will be a Construction and Environmental Management Plan (CEMP) to ensure that all risks are mitigated, both the risks inherent in any construction activity and any site-specific risks associated with the proximity of the works to existing infrastructure. The effective implementation of the CEMP will help to reduce the risks to the environment associated with the construction phase of the project. This will ensure that the potential risks of major accident and/or disaster are identified, avoided and mitigated, as necessary.

The CEMP is included in **Appendix 5.1** to **Volume 3** of this EIAR. There are no significant residual effects associated with the construction works.

### 17.8.2 Operational Phase

A discussion of the effects arising from normal operations of the plant is provided in other chapters of this EIAR. There are no residual effects associated with the scenarios discussed in this chapter, except in the case of an accident scenario. In the event of an accident occurring during operations, Indaver will have emergency response measures in place to minimise the impacts to human health and to the environment.

As the site is already licensed by the EPA (ref. W0167-03), Indaver has conducted an environmental liabilities risk assessment (ELRA) and prepared a closure restoration and aftercare management plan (CRAMP), in accordance with the EPA's guidance[9] both of which will be reviewed to reflect the expanded works on site. In accordance with the EPA's guidance, Indaver has put the appropriate financial provisions in place to cover the liabilities and potential liabilities identified in the ELRA and CRAMP. These provisions will also be reviewed. There are no significant residual effects associated with the operation phase.

## 17.9 References

Environmental Protection Agency (2017) Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports

European Commission (2017) Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report

BS 8800: 1996, Guide to Occupational Health and Safety Management Systems

Health & Safety Authority (2017 Guidance to Inspectors on the Assessment of Safety Reports under the COMAH Regulations 2015

Energy Institute (2012) Model Code of Safe Practice Part 19:  Fire precautions at petroleum refineries and bulk storage installations

TNO (Green Book) Methods for the determination of possible damage to people and objects resulting from releases of hazardous materials (CPR 16E)

EPA (2006) Guidance on Environmental Liability Risk Assessment, Residuals Management Plans and Financial Provision

[9] EPA (2006) Guidance on Environmental Liability Risk Assessment, Residuals Management Plans and Financial Provision