

Bringing Dublin Port To 2040

# **Technical Note 2**







Third & Final Masterplan Project



#### **Technical Note**

То:	Dublin Port Company	From:	Byrne Ó Cléirigh
Ref:	541-24X0183 R0	WBS:	541:07.03.05
Subject:	Dublin Port Company 3FM Project Response to HSA RFI on COMAH land use planning assessment	Date:	4 February 2025

#### 1 Introduction

In July 2024, Dublin Port Company (DPC) submitted an application to An Bord Pleanála for the development of the 3FM Project (ABP-320250-24). In support of the application, DPC submitted an assessment of the development under the *Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations*, 2015 – the COMAH Regulations – in light of the proximity of the 3FM Project to COMAH establishments in the Port.

As part of the planning process, we understand that ABP referred the application to the Health and Safety Authority (the competent authority under the COMAH Regulations), and that the HSA has requested further information to facilitate its assessment of the development. The request for additional information from the HSA is set out in Section 2 for convenience, and the corresponding information in response to the request is provided in Sections 3, 4, 5, 6, 7, and 8, corresponding to the six items from the HSA's request. This Technical Note should be read in conjunction with the DPC Response to Observations in relation to the Risk of Major Accidents & Disasters.

#### 2 HSA Request for Additional Information

In its request for further information (HSA reference CAS-09954-P7G5), the HSA sought the following information:

- Provide details regarding the proposed public amenity areas including the Port Park and Wildflower Meadow, Coastal Park, extension to the Irishtown Nature Park and active travel developments with regard to expected occupancy by members of the public, intended activities and event types. This information is required to determine the appropriate Sensitivity Levels according to the Authority's Guidance on Technical Land-Use Planning (TLUP).
- 2. The consultation distances associated with the COMAH establishments located at the North Port appear to extend into the proposed planning boundary. Impacts, if any, from these establishments should be considered.
- 3. Identify how dangerous substances will be stored at the proposed developments. Include the hazard categories, means of containment, dwell times and relative amounts of dangerous substances expected to be stored at the terminals, support storage areas and

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transit storage areas. These dangerous substances, if present, should be assessed in line with TLUP.

- 4. Provide an assessment of the proposed oil manifold and above ground pipelines intended to replace the existing Poolbeg Oil Jetty supplying the National Oil Reserves Agency (NORA) establishment at Poolbeg. Similarly, provide a review of the proposed development and associated works in the vicinity of the jetty supplying the NORA establishment at Ringsend.
- 5. Clarifications on sections 4 & 6, and subsequent risk contours in Appendix 5, in the above assessment: Note: All sections should reference the most recent version of TLUP
  - a. Section 4
    - i. This section does not contain details regarding consequence analysis assumptions and results (e.g. levels of thermal radiation or overpressure as a function of distance) for each scenario or the precise accident frequencies actually used in the risk assessment (taking into account number of tanks, lengths of pipeline, etc). The software models and versions used for the consequence and risk analysis should also be specified.
    - ii. Pool fires:
      - 1. The modelling of pool fires from bund overtopping needs to be clarified/improved.
      - A reasonable pragmatic risk-based approach for LUP purposes would be to assume that a 100m diameter circular pool forms adjacent to the bund in the direction of the receptor, with the wind (either D5 or F2) blowing directly towards the receptor.
      - 3. If the spill could reach uncontrolled off-site areas, the pool fire frequency should be taken as 5x10-7/yr. per tank (i.e. a 10% ignition probability) for Category 3 substances.
      - 4. The assessment (Table 11) appears to assume a 1% probability of ignition for a large unbunded spill of Category 3 flammable liquid going offsite to uncontrolled areas. A value of 10% is considered to be more appropriate for LUP purposes.
    - iii. In relation to natural gas; fireballs following significant pipeline failures, such as a pipeline rupture, are also a significant risk and should be considered.
  - b. Section 6
    - i. It is unclear precisely what assumptions have been used for the risk contours. The risks contours should be for a hypothetical member of a residential population with an occupancy of 100% who is outdoors 10% of the time and indoors for 90% of the time in a building with indoor overpressure vulnerability characterised by the CIA Category 3 relationship, and thermal radiation vulnerability as described in TLUP.
    - Given the complex multi-use nature of the development, it would be helpful to have a marked-up plan of the entire development which characterises every part of the development in terms of the relevant HSA Development Type (DT) (e.g. with colour codes for each DT). This should be overlaid with



the predicted risk contours. This would help demonstrate compliance with TLUP requirements.

6. An associated planning document in the 3FM planning file, titled 'Planning Report' (Section 5.1.2), refers to two proposed structures at Area N intended to support the proposed Lo-Lo terminal: an administration and a maintenance building. Clarify the occupancy for both of these buildings and whether either will be three or more occupied storeys in height.

#### 3 Item (1) – Public Amenity Area

There are three main areas of public amenity development as part of the 3FM Project, together with the active travel elements:

- the Port Park and Wildflower Meadow, to the west of Area O
- the Coastal Park, to the south of Area O
- the Extension to Irishtown Nature Park, to the east of Area O

These three areas currently comprise a mixture of existing amenity areas and existing developed / hardstanding areas, primarily serving as storage / laydown areas. The southern part of the Port Park and Wildflower Meadow, the majority of the Coastal Park, and the eastern part of the Extension to the Nature Park comprise publicly accessible footpaths providing access to / from Irishtown Nature Park (which lies to the east of these areas and is outside the area of the 3FM development) from Sean Moore Park / Beach Road.

The Port Park and Wildflower Meadow comprises several individual areas, namely:

- a sports pitch for use by the local community
- pedestrian routes and pathways
- a pavilion building with public toilets
- a public square area and urban realm treatment
- a children's play tower
- a wildflower meadow to the east

The entrance to the Port Park is from the south and west, with the sports pitch, open grass area, play tower and pavilion building generally to the west, south, and southwest, furthest from the COMAH and other establishments, with the meadow being the closest part of the Park to the Port activities.

Estimating the potential number of people that may be present in the Port Park overall, or in the individual parts of the Port Park, is not straightforward as these areas are open to the public. Nonetheless, to provide context for the HSA under the development sensitivity levels from its guidance on land use planning, the following population estimates are provided:

• Sports pitch

The sports pitch is designed for a recommended use of 4 to 6 hours per week. On average, it is expected that approximately 20 people may be present when the pitch is in use, yielding an overall annual occupancy of approximately

6,240 players, plus other support personnel (coaches, etc.). While this provides an estimate of the anticipated average occupancy, it is expected that more people will be present during peak periods (e.g. weekends, summertime), and although the pitch is not designed with any



stands or dedicated spectator accommodation, it is reasonable to expect that at certain times there may be spectators in addition to the players and support personnel.

While it is possible to estimate the average number of people that may use a sports pitch based on relevant design guidance, it is difficult to estimate the potential upper range during peak usage times.

Under the HSA's land use planning guidance, the development sensitivity levels for outdoor areas likely to attract the general public adopt the following thresholds:

- Sensitivity level 2: less than 100 people at any one time
- Sensitivity level 3: 100 to 1,000 people at any one time
- Sensitivity level 4: more than 1,000 people at any one time

Based on an average occupancy of 20 people, it is reasonable to conclude that during peak times the sports pitch and immediate vicinity could attract more than 100 people. However, given that it is designed as a community sports pitch and does not include specific provisions for spectators, it is unlikely that more than 1,000 people would be present at any one time, even during periods of peak use.

Therefore, it is reasonable to characterise the area of the sports pitch as development sensitivity level 3, which is compatible with lying inside the outer risk zone (or outside the outer risk zone). The individual risk contours associated with the COMAH establishments in the south port do not extend to the sports pitch.

• Port Park and Wildflower Meadow

The potential population of the other areas of the Port Park and Wildflower Meadow are more difficult to estimate given that they are, and will continue to be, accessible by the public. Several approaches to estimating the potential population of the Port Park (and other amenity areas) have been considered to provide the information sought by the HSA.

- Design guidance

There is a variety of design guidance for public amenity areas, including under the Dublin City Council Development Plan. However, this guidance is expressed in terms of the size of amenity area to be provided per head of population served by the amenity area, rather than in terms of the occupancy / visitor density of the amenity area, and therefore does not provide a useful basis for estimating an actual occupancy.

- Assessment of public amenity areas

A variety of research has been carried out into the public's use of public amenity areas, and the public's perception of crowding, in particular following COVID-19 and the guidance on social distancing. While the research provides a useful insight into certain aspects of the public's use of public amenity spaces, there is little to no data that can be utilised to estimate a potential occupancy for Port Park (or other amenity areas within the 3FM Project boundary).

Research into the area of *proxemics*, namely the study of the use of space and the effects that population density has on behaviour, communication, and social interaction. In *The Hidden Dimension*, Edward T Hall set out four 'distances' to describe people's sense of space and their interaction with others, with each of the four 'distances' expressed as both a 'close phase' and a 'far phase'. The shortest



'distance' is termed the 'intimate distance' and extends from direct contact to approximately 18 inches (approximately 0.46 m). The 'personal distance' is characterised as *a small protective sphere or bubble that an organism maintains between itself and others* and extends from approximately 0.5 m to 1.2 m.

The 'social distance' is characterised as the distance at which people, generally, interact with one another in a social context, for example during conversation, and extends approximately 1.2 m to 3.7 m. The fourth 'distance' is the 'public distance', which is generally characterised as the distance *well outside the circle of involvement*, extending from approximately 3.7 m to beyond 7.6 m.

While these four distances were developed to understand people's perception of their own space, they provide a reasonable means to estimate the occupancy of an open-air public amenity space used for recreational purposes. For example, a recent study on the *Effect of perceived crowding on risk perception in leisure sports based on Edward T Hall's concept of 'proxemics'*<sup>1</sup> demonstrated the effect of proxemics on the perceived crowding and risk perception of individuals in both indoor and outdoor spaces. While the study was carried out in the context of COVID-19 and risk perception, it indicates that proxemics and the concepts of social and public distances are a reasonable means to understand people's perception and use of public spaces.

If people, on average, tend towards a 'public distance' space when engaging in recreational activities of the type provided for by the Port Park, it is possible to estimate the number of people that may use the public spaces in comfort. The overall area of the Port Park and Wildflower Meadow (excluding the sports pitch) is approximately 1.99 ha. Applying the 'far phase' public distance, which is considered more representative of outdoor recreational space, yields an individual personal spaces of approximately 181 m<sup>2</sup>, equivalent to approximately 55 people per hectare. Therefore, a conservative estimate for the number of people that may be present in the Port Park and Wildflower Meadow is in the order of 110, which is significantly less than the threshold of 1,000 at which the areas may fall within the scope of sensitivity level 3 development types.

As shown in the individual risk contours, only part of the Port Park and Wildflower Meadow lies inside any of the risk zones, namely the northeast corner of the Wildflower Meadow. The overall area of the Wildflower Meadow is approximately 0.88 ha. Therefore, applying the 'proxemics' approach to this area alone indicates that the occupancy could be in the order of 50 people, again significantly less than the threshold of 1,000 people.

Coastal Park

The Coastal Park comprises the existing public amenity area to the south of the Port connecting to Irishtown Nature Park. As described in the application for planning permission, the 3FM Project primarily includes tree planting along the Coastal Park, with the overall footprint of the Park unchanged. The Coastal Park covers an area of approximately 1.6 ha, and therefore applying the 'proxemics' approach to this area indicates that the

<sup>&</sup>lt;sup>1</sup> Kim, YJ., Kang, SW. *Effect of perceived crowding on risk perception in leisure sports: an analysis based on Edward T Hall's concept of 'proxemics'*. Humanit Soc Sci Commun 11, 213 (2024).



occupancy could be in the order of 90 people, again significantly less than the threshold of 1,000 people.

• Extension to Irishtown Nature Park

The extension to Irishtown Nature Park covers part of the existing public area to the east of Area O, as well as the expansion of the public amenity area in an area of existing hardstanding. The extension to the Irishtown Nature Park covers an area of approximately 1.04 ha, and therefore applying the 'proxemics' approach to this area indicates that the occupancy could be in the order of 57 people, again significantly less than the threshold of 1,000 people.

If the overall area of the Port Park, Coastal Park, and extension to Irishtown Nature Park is considered a single area (excluding the sports pitch as this area has a distinct use), the total population that may be present is estimated at 500. As set out in this response, and described in the application for planning permission, the types of activity that are likely within the public amenity areas are accommodated under the HSA's development type DT2.5 and DT2.5.1, falling broadly within the example activities including

- sports fields / pitches
- country parks
- nature reserves
- picnic sites

As the public amenity area is likely to have (peak) occupancies greater than 100 people, but less than 1,000 people, it is equivalent to a sensitivity level 3 development (DT2.5.1). The majority of this area lies outside the outer zone, and therefore is compatible with the HSA's land use planning criteria. The part of this area that lies within the outer zone – part of the Wildflower Meadow – is also compatible with the HSA's land use planning criteria, as sensitivity level 3 developments can be accommodated within the outer zone.

The active travel areas within the 3FM Project comprise cycle paths / cycles tracks and pedestrian walkways and paths that integrate with the public amenity spaces. While it is equally difficult to estimate the occupancy of the active travel areas at any one time, the post-development use of these facilities is expected to be in the order of 2,600 to 3,000 non-motorised users (NMU – cyclists and pedestrians) per week, equivalent to approximately 370 to 430 per day over the entire length of the active travel routes. While there is no direct equivalent development type under the HSA's land use planning guidance, the active travel areas are broadly consistent with either development type DT2.3 (similar to roads) or DT2.5.1 (similar to outdoor areas for use by the public), corresponding to sensitivity level 2 and sensitivity level 3, respectively. As shown in Attachment 2, these areas lie largely outside the outer zone, or within the outer zone, and are therefore compatible with the HSA's land use planning criteria.

#### 4 Item (2) – North Port

The 3FM Project is primarily located in the south of Dublin Port (south of the River Liffey). However, parts of the 3FM Project – parts of the road network – lie within the north of Dublin Port (north of the River Liffey, primarily in the vicinity of the western part of the Circle K establishment. These parts of the 3FM Project lie within the consultation distance for the Circle K, Tedcastle Oil Products,



and Valero establishments. While the nature of these elements of the 3FM Project fall generally within the scope of development type DT2.3.1 (sensitivity level 1), with only a small part of the road development (along Promenade Road) falling within the scope of development type DT2.3 (sensitivity level 2), in light of the HSA's request the COMAH land use planning contours for the north of the Port associated with the Circle K, Tedcastle Oil Products, and Valero establishments have been added to the overall contour plot (see Attachment 1).

#### 5 Item (3) – Dangerous Substances

None of the Ro-Ro or Lo-Lo terminals, or other parts of the 3FM Project, are designed as dedicated facilities for the storage, or temporary storage, of dangerous substances; rather, they are intended to accommodate the Port's current and future operations, comprising the handling / management of trade traffic into and out of the Port. A proportion of trade via Dublin Port comprises packaged dangerous substances (goods), and therefore dangerous substances may be loaded or unloaded at the Dublin Port terminals. Activities within the Port, including the presence of dangerous goods, are subject to the control of Dublin Port Company under its byelaws, including:

- Bye-Laws for the Regulation of Goods on Quays
- Dangerous Goods Cargoes (Class 1) Bye-Laws 2015
- Dublin Port Bye-Laws Dangerous Goods (Cargoes) 2014

The byelaws apply to all parts of the Port estate, including the area of the south port under the 3FM Project. The byelaws governing dangerous goods set out specific requirements for the safe handling, temporary storage, and overall management, including the requirement to provide information to Dublin Port Company on the presence of such goods. The byelaws include the following provisions:

- The classes of dangerous goods (under ADR<sup>2</sup> / IMDG<sup>3</sup> / RID<sup>4</sup>) that are permitted within the Port, whether via direct transhipment (no temporary / intermediate storage within the Port) or that may be temporarily stored in the Port pending onward transport.
- The maximum quantity of dangerous goods that may be temporarily stored within the Port pending onward transport.
- The maximum storage duration for dangerous goods within the Port, typically between 1 and 14 days depending on the particular class of dangerous good.
- The requirements for reporting to Dublin Port Company the transport of dangerous goods within the Port estate, and providing Dublin Port Company details of any dangerous goods held at individual Port terminals.
- The authority of the Harbour Master to direct that dangerous goods be removed from the Port estate, if required.

Overall, the presence of dangerous goods within the Port is carefully controlled and managed by Dublin Port Company, to facilitate the transit of all goods through the Port, to minimise the overall quantity of dangerous goods temporarily held within the Port, and to allow the Port to respond to

<sup>&</sup>lt;sup>2</sup> Accord Européen Relatif au Transport International des Marchandises Dangereuses par Route

<sup>&</sup>lt;sup>3</sup> International Maritime Dangerous Goods Code

<sup>&</sup>lt;sup>4</sup> Regulations concerning the International Carriage of Dangerous Goods by Rail



any incidents involving dangerous goods, whether in transit or temporarily held at a Port terminal. From a COMAH perspective, the handling of dangerous goods within / through the Port falls outside the scope of the Regulations by virtue of Regulation 3(3)(c), namely:

the transport of dangerous substances and directly related intermediate temporary storage by road, rail, internal waterways, sea or air outside establishments defined in Regulation 2(1), including loading and unloading and transport to and from another means of transport at docks, wharves or marshalling yards

As set out in the HSA's Intermediate Temporary Storage – Guidance on interpretation of the exclusions related to 'directly related temporary intermediate storage' under COMAH, such temporary intermediate storage includes the following:

- driver rest breaks and daily / weekly rest periods
- time required to transfer a load from one form of transport to another
- time required to amalgamate or break down loads of packaged goods
- waiting time while transferring from one mode of transport to another

In addition, the HSA's guidance notes that *intermediate temporary storage* does not apply to dangerous substances that have not yet begun a journey. All dangerous goods that transit the Port, whether directly from ship to road transport or vice versa, or held temporarily pending transfer to the next mode of transport (and subject to the Dublin Port Company byelaws), are under consignment, with transhipment at Dublin Port forming part of their overall journey.

While the dangerous goods that are present at the Dublin Port terminals fall outside the scope of COMAH, their presence has been considered as part of the overall COMAH land use planning assessment in terms of acting as potential external initiating events at any of the COMAH establishments. In this context, the underlying probability data for the loss of containment scenarios and end events set out in the HSA's guidance is considered to be suitably representative, and conservative, and need not be adjusted to account for other external factors.

Similarly, the assessment of the loss of containment scenarios at each individual COMAH establishment considered the presence of adjacent / surrounding COMAH establishments (potential domino effects between establishments). As noted in Section 2.6 of the HSA's guidance:

Often, it is found that domino effects are not significant for LUP [land use planning], as the likelihood of an event at Site A triggering a major event at Site B is an order of magnitude less than the base case likelihood of the event at Site B. Nevertheless, as a general rule of thumb, the potential for domino effects will always be considered at establishments within 500 m of each other.

In light of the overall conservative approach set out in the HSA's guidance for COMAH land use planning, and the nature and location of the COMAH establishments in the Port, the HSA's probability data is considered to be appropriate and conservative for the overall assessment of the 3FM Project.



#### 6 Item (4) – Poolbeg Oil Jetty

Chapter 5 of the EIAR, and in particular Sections 5.1.2.2, 5.1.2.6 and 5.2.3.1, describes the existing oil manifold used to transfer oil from tankers at Berths 46 or 47 to the National Oil Reserves Agency (NORA) Ringsend facility. The existing manifold is located below ground at the existing marine terminal / deep water berths, protected by a steel cover to allow crane and other traffic to operate in the area. The NORA Poolbeg facility, to the east, is served by the existing ESB jetty, with tankers unloading via the existing marine unloading arms and an aboveground pipeline serving the NORA facility.

Both the existing manifold serving the Ringsend facility and the jetty serving the Poolbeg facility lie within the area of the 3FM Project. Therefore, as part of the 3FM Project, the existing Poolbeg Oil Jetty will be demolished and replaced by new berthage, a new oil manifold, and new above ground oil pipework and access for maintenance. While the new manifold and new pipework represents new infrastructure, it is replacing existing infrastructure currently used to transfer oil from tankers at either the ESB Jetty or Deep Water Berths 46 or 47 to the NORA Poolbeg and NORA Ringsend facilities, respectively.

As in the case of the dangerous substances that may be present within the Port terminals, the change to the oil pipework serving the two NORA facilities was considered as part of the overall COMAH land use planning assessment. However, based on the following, we consider that the overall COMAH land use planning assessment is representative of the overall risk:

- The potential major accident hazards associated with the storage tanks include several largescale loss of containment events, and these tanks are in turn fed from the pipelines.
- The new manifold and aboveground pipework represent modifications to existing infrastructure, rather than the addition of new infrastructure (and a potential new hazard source).
- The manifold and pipelines will convey only ignition category 3 substances.
- The NORA facilities are used for the long-term storage of Ireland's oil reserves and therefore the frequency of product movement is very low compared to a commercial oil terminal.
- The HSA's land use planning guidance sets out the types of scenario relevant to oil storage facilities, which are primarily related to the storage tanks and, where applicable, to road tanker activities, rather than to losses of containment from tankers (ships), manifolds, or pipelines.

#### 7 Item (5) – Consequence Analysis & Risk Contours

#### 7.1 Consequence Analysis

#### 7.1.1 Underlying Assumptions

Section 4.1.2 of the *COMAH Land Use Planning Assessment* notes that the HSA has set out its policy and approach to conducting land use planning assessments in its *Guidance on technical land use planning advice* (2023). This is the latest, and current, version of the HSA's guidance, and the guidance has been applied in the land use planning assessment. While the HSA's guidance is not explicitly referenced in each individual section and subsection of the land use planning assessment, the HSA's 2023 guidance has been applied to the assessment of the 3FM Project.



The consequences associated with the loss of containment events – fires, vapour cloud explosions, flash fires – for both liquid and gas releases have been determined using the latest version of the Gexcon EFFECTS modelling software (version 12.2.0 at the time of the assessment). The results from the consequence modelling – thermal radiation and explosion overpressures – have been expressed as the probability of experiencing lethal effects using the probits set out in the HSA's guidance (described in Section 4.4 of the land use planning assessment), and have been aggregated for all the individual scenarios using a proprietary risk aggregation tool<sup>5</sup>.

The results from the consequence modelling comprise multiple distance-versus-consequence tables, and while the results were used directly within the assessment, they were not included in the report on the land use planning assessment. In light of the HSA's request, a summary of the consequence modelling data is provided in Attachment 3 to this Technical Note. In addition, the report on the land use planning assessment did not include the detailed set of loss of containment scenarios, end events, and corresponding frequencies, as these are based on the HSA's set of scenarios in its guidance. In addition to the summary of the consequence modelling, Attachment 4 to this Technical Note includes a summary of the individual scenarios that underpin the analysis.

#### 7.1.2 Pool Fires

The pool fire scenarios associated with the COMAH establishments have been assessed in accordance with the HSA's land use planning guidance. As per the HSA's guidance, instantaneous failure from a bulk storage tank has the potential to result in overtopping of the secondary containment (bund). Sections 3.6.1 and 3.6.2 of the HSA's guidance advises that in the case of bund overtopping, *the pool diameter modelled is never greater than 100 m*, and this approach has been adopted for the pool fire scenarios in the 3FM Project land use planning assessment.

In particular, it accounts for the construction of the Lo-Lo Terminal in Area N, to the north of the NORA Poolbeg facility. In the event of a catastrophic failure of a tank towards the north, there is currently very little land on which a pool could form, and therefore under the current layout of the Port a pool fire to the north of the NORA Poolbeg facility is not considered credible. However, construction of the Lo-Lo Terminal will provide an area on which overtopped material could accumulate, and therefore a pool fire to the north of the NORA Poolbeg facility following the 3FM Project is a credible event and has been included in the assessment.

While the probability of ignition of ignition category 3 substances – such as kerosene and diesel – are generally taken to be zero (as per the HSA's guidance), if the material overtops the bund it is conservatively assumed that the resulting pool could ignite. The HSA's guidance does not explicitly specify the probability of ignition for such scenarios, but rather advises that *a pool fire and its consequences will have to be modelled*, and indicates that the ignition probabilities for category 1 or category 2 substances may be appropriate.

<sup>&</sup>lt;sup>5</sup> The proprietary tool calculates the distance versus lethal effects in all directions for each individual loss of containment scenario and individual end event, determines the lethal effects at each point on a grid extending across the overall assessment domain (the area of the 3FM Project and the surroundings), and sums all of the lethal effects at each point on the grid to yield the aggregate risk profile. The individual risk contours are generated from the aggregate data across the grid using the contour function in the QGIS software (version 3.34 at the time of the assessment).



In the absence of specific guidance on the ignition probability of an overtop pool fire for ignition category 3 substances, the COMAH land use planning assessment has adopted the ignition probability for ignition category 2 substances (as indicated in Section 3.6.4 of the guidance), which advises that:

## Ignition probabilities for Category 2 substances are very low... An overtop pool fire is also modelled at a frequency of $5 \times 10^{-8}$ per tank.

This ignition probability for overtopping pool fires of category 3 substances is both conservative and consistent with the HSA's guidance. It is considered to be more appropriate than an ignition probability of  $5 \times 10^{-7}$  per tank as indicated in the HSA's request for further information. Based on our review of the HSA's guidance, we have not identified any reference to a 10% probability of ignition of a overtopped pool of ignition category 3 material, and from our understanding of the HSA's guidance, such a probability of ignition (10%) suggests that ignition category 3 substances are *more* likely to ignite than ignition category 2 substances.

#### 7.1.3 Natural Gas Pipelines

Section 4.3.2 of the *COMAH Land Use Planning Assessment* summarises the scenarios that have been accounted for, Table 10 lists the establishments (and other sites) that have been included together with the dangerous substances, and Table 12 summarises the major accident scenarios that have been include for aboveground natural gas pipelines.

Section 3.5 of the HSA's guidance describes the approach to be taken for establishments where there is a significant major accident risk associated with releases from on-site natural gas pipelines, with the specific loss of containment scenarios and corresponding frequencies set out in Table 40 in Section 3.5.1. The loss of containment scenarios set out in the HSA's guidance – a pipeline rupture (event #087) and pipeline leak (event #088) – and the corresponding end events – a fireball / jet fire, flash fire, and vapour cloud explosion – have been included in the assessment.

#### 7.2 Risk Contours

#### 7.2.1 Underlying Assumptions

As noted in Section 2.5 of the *COMAH Land Use Planning Assessment*, the assessment and analysis was carried out in accordance with the HSA's 2023 guidance. Therefore, while the assessment did not explicitly set out each of the underlying assumptions specified in the guidance, the assumptions from the HSA's guidance were applied.

In this context, the individual risk contours were developed using the population data for the Port and surrounding area, as described in Section 3.5. For the residential areas in the vicinity of the Port and the 3FM project, people were assumed to be present 100% of the time, with the population also assumed to be indoors 90% of the time and outdoors 10% of the time.

For the other populations at and in the vicinity of the Port, the occupancy was based on a combination of typical working hours, an analysis of ship berthing data and ship crew and passenger complements, and an analysis of traffic data.



For the assessment of the vulnerability of people located indoors, the approach from the HSA's land use planning guidance was adopted, as described in Section 4.4.2 for thermal effects. For overpressure effects, the correlation from the Chemical Industry Association's *Guidance for the location and design of occupied buildings on chemical manufacturing sites* for building type (category) 3 has been applied.

#### 7.2.2 HSA Development Types

Attachment 2 shows the layout of the 3FM development, with each element of the development classified under the corresponding development type and sensitivity level together with the individual risk contours. In assigning the development types and sensitivity levels to the different elements of the 3FM Project, all parts of each element are assigned the most conservative sensitivity level. For example, as noted in the response to item (6) (see Section 8), Area N is assigned sensitivity level 2 by virtue of part of Area N – the administration building – falling within this sensitivity level (exclusion DT1.1.1), albeit that the majority of Area N could be considered as sensitivity level 1.

#### 8 Item (6) – Planning Report

Section 5.1.2 of the *Planning Report* describes the overall layout of the Lo-Lo container terminal in Areas L and N, noting that:

• Area L

...the provision of a container storage and handling yard with a new reinforced concrete slab tied into the existing quay levels [together] with a single-storey (4.9 m high) administration building

Area N

*The terminal will include a three-storey (14.8 m high) administration building and a maintenance building (12.5 m high).* 

As noted in Section 6.1.2.4 of the report on the land use planning assessment, Areas L and N generally fall within the scope of development type DT1.1 (sensitivity level 1) under the HSA's guidance, namely *workplaces providing for fewer than 100 occupants in each building and fewer than three occupied storeys*. However, as noted in the *Planning Report*, the administration building in Area N is a three-storey building and therefore this part of Area N falls within the scope of exclusion DT1.1.1 (sensitivity level 2), namely *workplaces (non-retail) providing for 100 or more occupants in any building or 3 or more occupied storeys in height*.

In practice, it is unlikely that there would be more than 100 people inside the administration building at any one time given that the overall occupancy of Area N is estimated at 108 across the entire area. Nonetheless, given that the administration building is three storeys, it falls within exclusion DT1.1.1 and is therefore a sensitivity level 2 area. Similarly, it is unlikely that there would be more than 100 people inside the maintenance building in Area N, or more than 100 people inside the administration building in Area N, or more than 100 people inside the Area N at any one time.

Based on the HSA's matrix for land use planning advice – whether development sensitivity types are compatible with the risk zone in which they lie, shown in Table 1 – both the administration building



and the maintenance building in Area N, and the administration building in Area L, satisfy the land use planning criteria. Both areas are located partly in the outer zone, while the two buildings in Area N and the single building in Area L all lie *outside* the outer zone.

#### Table 1: HSA Matrix for Land Use Planning Advice

Sensitivity Level	Inner Zone	Middle Zone	Outer Zone
Level 1	$\checkmark$	$\checkmark$	$\checkmark$
Level 2	x	$\checkmark$	$\checkmark$
Level 3	x	×	$\checkmark$
Level 4	×	×	×

#### 9 Summary

As set out in Section 8 of the *COMAH Land Use Planning Assessment of Dublin Port Company's 3FM Project*, in our opinion, the potential major accident risks associated with the proposed project satisfy the Health and Safety Authority's COMAH land use planning guidance. In our opinion, the additional information provided in this Technical Note further demonstrate that the 3FM Project satisfies the Health and Safety Authority's COMAH land use planning guidance.

\* \* \* \* \*



### Attachment 1: Individual Risk Contours (North & South Port)





Attachment 2: Development Sensitivity Levels & Individual Risk Contours









1 × 10-7 per year 1 × 10-6 per year



1 × 10-5 per year **Development Sensitivity Levels** 

- Sensitivity Level 1 Sensitivity Level 2
- Sensitivity Level 3

n/a

Notes

	Inner zone	Middle zone	Outer zone
Level 1	~	$\checkmark$	$\checkmark$
Level 2	×	$\checkmark$	$\checkmark$
Level 3	×	×	$\checkmark$
Level 4	×	×	×



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Dublin Port Company

Dublin Port Company 3FM Project

COMAH land use planning assessmen Individual Risk Contours & Development Sensitivity Levels	nt
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#### Attachment 3: Summary of Consequence Modelling



#### Table 2: Summary of consequence modelling data (lethal effects against distance)

Source	Class I	tanks	Class I	I tanks	Class II	I tanks	Natural gas pipelines												
Loss of containment ->	Instantaneo over (100 m dian	us failure – top neter pool)	Instantaned ove (100 m diar	ous failure – rtop meter pool)	Instantaned over (100 m diar	ous failure – rtop neter pool)	Pipeline rupture							Pipeline leak					
P(LOC) ->	5.00 × 10 <sup>-6</sup> 5.00 × 10 <sup>-6</sup>		× 10 <sup>-6</sup>	5.00 >	× 10 <sup>-6</sup>	1.00 ×	10 <sup>-7</sup>	1.00 >	1.00 × 10 <sup>-7</sup> 1.00 × 10 <sup>-7</sup>		5.00 × 10 <sup>-7</sup>		5.00 × 10 <sup>-7</sup>		5.00 >	< 10 <sup>-7</sup>			
End event ->	Pool fire Fire		Fire		Fire		ire	Flash	fire	v	CE	Jet f	fire	Flash	fire	vo	E		
P(end event) ->	9.96 × 10 <sup>-7</sup>		5.00 × 10 <sup>-8</sup>		5.00 × 10 <sup>-8</sup>		1.00 ×	10 <sup>-8</sup>	3.60 × 10 <sup>-8</sup> 5.40 × 10		× 10 <sup>-8</sup>	5.00 ×	< 10 <sup>-8</sup>	1.80 ×	.0 × 10 <sup>-7</sup> 2.70 × 10 <sup>-7</sup>		< 10 <sup>-7</sup>		
Event # ->	91		91 123		123		89	)	8	9	8	9	90	0	90		90		
Weather / meteorology ->	5 m/s	10 m/s	5 m/s	10 m/s	5 m/s	10 m/s	D5	F2	D5	F2	D5	F2	D5	F2	D5	F2	D5	F2	
Distance (downwind) (m)	Lethality																		
0	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	1.9%	91.4%	100.0%	100.0%	5.4%	10.6%	0.0%	0.0%	100.0%	100.0%	1.1%	3.5%	
5	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	12.4%	97.3%	100.0%	100.0%	7.8%	16.5%	21.8%	1.1%	63.7%	45.5%	4.8%	31.1%	
10	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	32.9%	99.7%	100.0%	100.0%	11.3%	25.8%	4.3%	0.2%	25.7%	17.0%	24.9%	96.1%	
15	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	51.5%	99.9%	100.0%	100.0%	16.7%	40.6%	0.1%	0.0%	15.3%	10.2%	98.8%	12.4%	
20	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	63.7%	100.0%	93.6%	86.6%	24.9%	62.2%	0.0%	0.0%	10.9%	4.4%	49.3%	1.6%	
25	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	73.6%	100.0%	71.7%	65.1%	37.1%	87.4%	0.0%	0.0%	8.5%	0.0%	9.0%	0.3%	
30	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	76.4%	100.0%	57.5%	52.4%	54.5%	99.8%	0.0%	0.0%	6.9%	0.0%	2.0%	0.1%	
35	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	77.6%	100.0%	48.2%	44.0%	76.6%	99.8%	0.0%	0.0%	2.4%	0.0%	0.5%	0.0%	
40	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	77.7%	100.0%	41.5%	37.9%	95.7%	87.4%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	
45	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	76.2%	100.0%	36.4%	33.3%	100.0%	62.2%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	
50	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	74.5%	100.0%	32.5%	29.8%	99.1%	40.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
55	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	72.3%	99.9%	29.4%	26.9%	85.3%	25.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
60	100.0%	100.0%	99.4%	100.0%	99.9%	100.0%	69.4%	99.9%	26.8%	24.5%	63.0%	16.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
65	99.7%	99.9%	99.9%	85.3%	99.3%	99.4%	66.1%	99.9%	24.6%	22.5%	43.4%	10.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
70	97.6%	96.8%	88.5%	99.8%	73.4%	98.2%	60.2%	99.8%	22.8%	1.3%	29.2%	6.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
75	88.1%	89.2%	68.8%	99.0%	45.5%	96.5%	55.7%	99.7%	21.2%	0.0%	19.6%	4.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
80	74.4%	85.1%	49.1%	74.1%	28.0%	60.5%	50.9%	99.6%	19.8%	0.0%	13.2%	3.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
90	34.7%	59.6%	15.3%	40.2%	6.4%	26.8%	37.6%	99.1%	18.0%	0.0%	6.2%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
100	12.6%	32.9%	4.0%	17.6%	1.3%	9.5%	27.3%	97.7%	3.6%	0.0%	3.1%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	



Source	Class I	tanks	Class I	I tanks	Class II	I tanks	Natural gas											
Loss of containment ->	Instantaneo over (100 m dian	us failure – top neter pool)	Instantanec ove (100 m diar	ous failure – rtop meter pool)	Instantaneo over (100 m dian	ous failure – rtop neter pool)	Pipeline rupture					Pipeline leak						
P(LOC) ->	5.00 ×	5.00 × 10 <sup>-6</sup> 5.00 × 10 <sup>-6</sup>		× 10 <sup>-6</sup>	5.00 × 10 <sup>-6</sup>		1.00	× 10 <sup>-7</sup>	1.00	× 10 <sup>-7</sup>	1.00	× 10 <sup>-7</sup>	5.00	× 10 <sup>-7</sup>	5.00 >	< 10 <sup>-7</sup>	5.00 >	× 10 <sup>-7</sup>
End event ->	Pool fire Fire		re	Fire		Jet fire		Flash	sh fire VCE		Jet	fire	Flash fire		VCE			
P(end event) ->	9.96 × 10 <sup>-7</sup>		9.96 × 10 <sup>-7</sup> 5.00 × 10 <sup>-8</sup>		5.00 × 10 <sup>-8</sup>		1.00 × 10 <sup>-8</sup>		3.60	3.60 × 10 <sup>-8</sup> 5.40 × 10 <sup>-8</sup>		5.00 × 10 <sup>-8</sup>		1.80 × 10 <sup>-7</sup>		2.70 × 10 <sup>-7</sup>		
Event # ->	91		12	23	12	23	8	9	8	89 89		90		90		90		
Weather / meteorology ->	5 m/s	10 m/s	5 m/s	10 m/s	5 m/s	10 m/s	D5	F2	D5	F2	D5	F2	D5	F2	D5	F2	D5	F2
Distance (downwind) (m)						·			Leth	ality								
110	2.9%	12.1%	0.6%	4.6%	0.1%	1.9%	18.4%	94.3%	0.0%	0.0%	1.6%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
120	0.5%	3.4%	0.1%	0.9%	0.0%	0.3%	9.9%	89.3%	0.0%	0.0%	0.9%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
130	0.1%	0.9%	0.0%	0.1%	0.0%	0.0%	5.4%	78.0%	0.0%	0.0%	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
140	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	2.3%	65.8%	0.0%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
150	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	46.5%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
160	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	27.9%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
170	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	16.9%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
180	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
200	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
220	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
240	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%



#### Attachment 4: Summary of Loss of Containment Scenarios & End Events

#### Loss of P(LOC) End event P(end event) Event # Source containment Pool fire $9.96 \times 10^{-7}$ 091 VCE $1.82 \times 10^{-6}$ 092 Instantaneous $5.00 \times 10^{-6}$ failure Flash fire $5.46 \times 10^{-7}$ 093 None $1.64 \times 10^{-7}$ 094 9.96 × 10<sup>-7</sup> Pool fire 095 VCE $1.82 \times 10^{-6}$ 096 Failure over 10 $5.00 \times 10^{-6}$ minutes Flash fire $5.46 \times 10^{-7}$ 097 $1.64 \times 10^{-7}$ 098 None Class I tanks Pool fire 1.99 × 10<sup>-5</sup> 099 3.64 × 10<sup>-5</sup> VCE 100 10 mm pipe leak $5.00 \times 10^{-6}$ over 30 minutes Flash fire $1.09 \times 10^{-5}$ 101 $3.28 \times 10^{-5}$ None 102 Pool fire $9.96 \times 10^{-7}$ 103 VCE 1.82 × 10<sup>-6</sup> 104 Instantaneous $5.00 \times 10^{-6}$ failure – overtop Flash fire $5.46 \times 10^{-7}$ 105 $1.64 \times 10^{-7}$ None 106 Instantaneous Class II tanks $5.00 \times 10^{-6}$ Fire $5.00 \times 10^{-8}$ 123 failure – overtop Instantaneous Class III tanks $5.00 \times 10^{-6}$ Fire $5.00 \times 10^{-8}$ 123 failure – overtop $1.00 \times 10^{-7}$ Jet fire $1.00 \times 10^{-8}$ 089 $1.00 \times 10^{-7}$ $3.60 \times 10^{-8}$ Pipeline rupture Flash fire 089 $1.00 \times 10^{-7}$ VCE $5.40 \times 10^{-8}$ 089 Natural gas pipelines $5.00 \times 10^{-7}$ $5.00 \times 10^{-8}$ Jet fire 090 $5.00 \times 10^{-7}$ Pipeline leak Flash fire $1.80 \times 10^{-7}$ 090 $5.00 \times 10^{-7}$ $2.70 \times 10^{-7}$ VCE 090

#### Table 3: Loss of containment & end events from HSA guidance