MP2 PROJECT

CONTROL OF MAJOR ACCIDENT HAZARDS (COMAH) LAND USE PLANNING ASSESSMENT

COMHLACHT CHALAFORT ÁTHA CLIATH
DUBLIN PORT COMPANY

rps MAKING COMPLEX EASY

COMAH Land Use Planning Assessment of

Dublin Port Company's MP2 Project

***Prepared for*:**

RPS

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REVISION HISTORY

Revision	Date	Description
0	28 May 2019	First issue.
1	25 June 2019	Updates in response to comments on revision 0.

Contents

APPENDICES

1 INTRODUCTION

Dublin Port Company is progressing its MP2 Project, part of which includes redevelopment / reconfiguration of the eastern part of the Port serving the three ferry terminals (Terminals 1, 2 and 5). This development is within the vicinity of several establishments that fall within the scope of the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations, 2015 (the COMAH Regulations), in particulate the Calor establishment and the Indaver establishment, to the west of the development on the northern side of Tolka Quay Road.

To support the development of the MP2 Project, RPS (Dublin Port Company's planning advisors) requested Byrne Ó Cléirigh to conduct a COMAH land use planning assessment of the development. The purpose of the assessment is to examine the development in the context of the Health and Safety Authority's COMAH land use planning guidance, to identify the types of development that may be compatible with the COMAH risk zones around the Calor (and other COMAH) establishment, and to conduct a high-level review of the Calor installation to ascertain whether the risk zones could be reduced. This report describes our assessment of the development and our conclusions as to the individual and societal risk presented to the development from the COMAH establishments.

2 PLANNING CONTEXT

2.1 Dublin City Development Plan

In accordance with the Planning and Development Act, 2000, as amended, Dublin City Council (DCC) has prepared the latest version of its development plan: *The Dublin City Development Plan 2016-2022*. Section 9.5.10 of the Plan (reproduced in Appendix 6) summarises the COMAH legislative regime and the role of the Health and Safety Authority (HSA) in providing advice to planning authorities. DCC also sets out its policy regarding developments of establishments that fall within the scope of the COMAH Regulations and developments near such establishments:

> *It is the Policy of Dublin City Council:*
>
> *SI28: To have regard to the provisions of the Major Accidents Directive (2012/18/EU), relating to the control of major accident hazards involving dangerous substances and its objectives are to prevent major accidents and limit the consequences of such accidents. Dublin City Council will have regard to the provisions of the directive and recommendations of the HSA in the assessment of all planning applications located on or impacted by such sites.*

2.2 An Bord Pleanála

In December 2011, the HSA and An Bord Pleanála (ABP) signed a Memorandum of Understanding (MOU) to facilitate the co-operation between the two bodies in the processing of applications for planning permission under planning legislation, and in particular direct applications to ABP under the *Planning and Development (Strategic Infrastructure) Act* 2006 (the SIA).

The MOU noted that the HSA is obliged to provide technical land use planning advice relating to developments that qualify as COMAH establishments, or relating to developments in the vicinity of COMAH establishments, and that this advice must be provided to ABP on request and within prescribed timeframes. It also recognised that assessments by the HSA of planning applications from COMAH establishments or of developments in the vicinity of COMAH establishments can take a considerable amount of time and therefore sufficient lead time should be afforded to the HSA to formulate its technical advice to ABP.

In this context, ABP undertook to ensure that details of any proposed planning applications under the SIA and on which ABP may seek technical advice from the HSA, are made available to the HSA at the earliest opportunity. In addition, ABP noted that it will request that such details are provided to the HSA at the pre-application consultation stage by the (prospective) applicant.

2.3 Strategic Infrastructure Act

The SIA provided for, amongst other items, submitting applications for planning permission directly to An Bord Pleanála for certain developments of strategic importance to the state, and for the determinations of such applications to be carried out promptly. The types of strategic development that were included in the SIA included energy, transport, environmental and healthcare infrastructure. The specific types of transport infrastructure set out in the Act are:

1. An intermodal transhipment facility, an intermodal terminal or a passenger or goods facility which, in each case, would exceed 5 hectares in area.
2. A terminal, building or installation associated with a long-distance railway, tramway, surface, elevated or underground railway or railway supported by suspended lines or similar lines of a particular type, used exclusively or mainly for passenger transport, but excluding any proposed railway works referred to in section 37(3) of the Transport (Railway Infrastructure) Act 2001 (as amended by the Planning and Development (Strategic Infrastructure) Act 2006).
3. An airport (with not less than 2 million instances of passenger use per annum) or any runway, taxiway, pier, carpark, terminal or other facility or installation related to it (whether as regards passenger traffic or cargo traffic).
4. A harbour or port installation (which may include facilities in the form of loading or unloading areas, vehicle queuing and parking areas, ship repair areas, areas for berthing or drydocking of ships, areas for the weighing, handling or transport of goods or the movement or transport of passengers (including customs or passport control facilities), associated administrative offices or other similar facilities directly related to and forming an integral part of the installation)
    a) where the area or additional area of water enclosed would be 20 hectares or more, or
    b) which would involve the reclamation of 5 hectares or more of land, or
    c) which would involve the construction of one or more quays which or each of which would exceed 100 metres in length, or
    d) which would enable a vessel of over 1,350 tonnes to enter within it.

2.4 Planning & Development Regulations

Part 11 of the *Planning and Development Regulations*, as amended (reproduced in Appendix 7), sets out the requirements for planning applications relating to developments subject to the COMAH legislation. Article 137(1) requires that a planning authority[1] notifies the HSA where:

[1] A planning authority is defined as a local authority in the *Planning and Development Act*

(b) a planning authority receives a planning application relating to development which would—

(i) be of a category listed in Table 1 of Schedule 8, and

(ii) be located within the distance listed in column 2 of Table 2 of Schedule 8 from an establishment of the corresponding type listed in column 1 of Table 2, or be located within such distance from a particular establishment as has been specified by the Health and Safety Authority in technical advice provided under article 27 of the Major Accident Regulations,

and the Health and Safety Authority has not previously provided, either in relation to the development to which the application relates or on a generic basis, relevant technical advice on the risk or consequences of a major accident,

(c) a planning authority receives a planning application relating to development which would, in its opinion, be–

(i) in the vicinity of an establishment, and

(ii) relevant to the risk or consequences of a major accident,

and the Health and Safety Authority has not previously provided, either in relation to the development to which the application relates or on a generic basis, relevant technical advice on the risk or consequences of a major accident, the planning authority shall notify the Health and Safety Authority.

Article 141 of the Regulations applies to planning appeals to ABP and places a similar obligation on ABP to notify the HSA of development at, in the vicinity of, or potentially affected by COMAH establishments.

As the MP2 Project is in the vicinity of the Calor and Indaver COMAH establishments (refer to Section 3.3) and may fall within one of the categories of development in Table 1 of Schedule 8 of the *Planning and Development Regulations* (a transport link), the provisions of Articles 137(1)(b) or 137(1)(c), or the corresponding provisions under Article 141 applicable to ABP, may apply.

2.5 COMAH Regulations

The COMAH Regulations have been made under the *Chemicals Acts 2008 and 2010* to transpose *Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC* ("the SEVESO III Directive"). The purpose of the COMAH Regulations is to lay down rules for the prevention of major accidents involving dangerous substances, and to seek to limit as far as possible the consequences for human health and the environment of such accidents when they occur, with the overall objective of providing a high level of protection in a consistent and effective manner.

The COMAH Regulations place an obligation on operators of establishments that store, handle or process dangerous substances above certain thresholds to take all necessary measures to prevent major accidents and to limit the consequences for human health and the environment. Under the Regulations, an establishment may qualify as upper tier or lower tier, depending on the inventory of dangerous substances; sites that store, handle or process dangerous substances below a certain threshold do not qualify as establishments under the Regulations.

The types of dangerous substance that contribute to an establishment's inventory include flammable substances (such as liquefied petroleum gas, gasoline / petrol, kerosene, and certain solvents), toxic substances, and substances that are hazardous to the aquatic environment. The types of establishment that may fall within the scope of the Regulations (depending on their inventories) include oil storage & distribution sites, LPG storage & distribution sites, pharmaceutical plants, and sites that manufacture and / or store certain types of fertiliser.

Under Part 7 of the Regulations, the HSA, as the Central Competent Authority, can provide technical advice to a planning authority[2] on developments of, or in the vicinity of, COMAH establishments, as follows:

> *24(2) The Central Competent Authority shall provide technical advice in response to a notice sent by a planning authority under Part 11 of the Planning and Development Regulations 2001 (SI No. 600 of 2001), requesting technical advice on the effects of a proposed development on the risk or consequences of a major accident in relation to the following types of developments…*
>
> > *(a) the siting and development of new establishments;*
> >
> > *(b) modifications to establishments… [which could have significant consequences for major accident hazards…];*
> >
> > *(c) new developments including transport routes, locations of public use and residential areas in the vicinity of establishments, where the siting, modifications or developments may be the source of, or increase the risk or consequences of, a major accident.*

This COMAH land use planning assessment of the MP2 Project has been prepared in accordance with the *Policy & Approach of the Health & Safety Authority to COMAH Risk-based Land-use Planning (2010)* to assist the competent authorities in their consideration of the applications for development consent.

3 DUBLIN PORT

3.1 Port Activities

The Port covers approximately 265 hectares to the north and south of the River Liffey, within which the following activities and operations take place:

- load-on / load-off (Lo / Lo) terminals
- roll-on / roll-off (Ro / Ro) terminals, for both freight and passenger traffic
- storage facilities for petroleum products, LPG and molasses
- common oil pipeline linking the oil berths with the petroleum, LPG and molasses storage facilities
- dry bulk handling facilities for a wide variety of materials, including peat, grain, animal feedstuff, fertiliser, sand, coal, petroleum coke, slags, scrap metals and cement
- warehouse space

[2] Under the COMAH Regulations, a planning authority is defined as a local authority (under the *Planning and Development Act*) and includes, where appropriate, An Bord Pleanála.

- vehicle storage facilities
- cruise liner operations
- leisure craft mooring and movements at Poolbeg (south of the river) and Dublin City Marinas.

3.2 Dublin Port Company Masterplan

3.2.1 Dublin Port Masterplan 2012 – 2040

In 2012, DPC published its Masterplan 2012 – 2040, which presented a vision for future operations at the Port and critically examined how the existing land use at Dublin Port can be optimised for merchandise trade purposes. The Masterplan 2012 also outlines how DPC will work to better integrate the Port with the City and its people.

The Masterplan 2012 was prepared to:

- Plan for future sustainable growth and changes in facilitating seaborne trade in goods and passenger movements to and from Ireland and the Dublin Region in particular.
- Provide an overall context for future investment decisions.
- Reflect and provide for current national and regional guidelines and initiatives.
- Ensure there is harmony and synergy between the plans for the Port and those for the Dublin Docklands Area, Dublin City and neighbouring counties within the Dublin Region.
- Give some certainty to customers about how the Port will develop in the future to meet their requirements.

The Masterplan 2012 addressed the key issues around the future development of the Port by reference to developments in merchandise trade and key sectors of the economy. It also examined the existing land utilisation at Dublin Port and suggested some options for future development at the Port which will facilitate the Port handling 60 million tonnes by 2040.

3.2.2 Dublin Port Masterplan 2040 – Review 2018

DPC's Masterplan is subject to periodic review, with the first such review initiated in 2017 and concluded in 2018, with the draft of the review – Dublin Port Masterplan 2040 - Reviewed 2018 – published in April 2018. The purpose of the review was to ensure that the Masterplan 2040 remains relevant and achieves its central objective of providing a clear vision for the sustainable development of Dublin Port into the future.

The context for the review was the economic resurgence, with five years of consistent growth in cargo volumes (30% growth since 2012) and each of the last three years a record year, while national policy continues to evolve with the publication of Project Ireland 2040 National Planning Framework.

Development works at Dublin Port are already advanced with construction of the Alexandra Basin Redevelopment (ABR) Project underway and capital investment of €1 billion planned over the next decade. Elsewhere, works have commenced on the development of the 44 ha Dublin Inland Port adjacent to Dublin Airport. Between now and 2040, other major development projects are envisaged on both the north side of the Port and on the Poolbeg Peninsula to complete the development vision of Masterplan 2040.

Since Dublin Port commenced consultation on the review of the Masterplan, a Strategic Environmental Assessment (SEA) Environmental Report and Natura Impact Statement have also been undertaken and the findings incorporated into the Masterplan.

3.2.3 MP2 Project

The MP2 Project – the subject of this COMAH land use planning assessment – is the second major capital project from the Dublin Port Masterplan. The MP2 Project is required to facilitate Dublin Port to maximise the efficient use of land adjacent to river berths and to facilitate the efficient operation of key aspects of port operations for Ro-Ro, Lo-Lo and passenger traffic.

The Project will involve reconfiguring existing facilities to allow Dublin Port to meet the anticipated growth in passenger and mercantile trade in the period through to 2040. This will be done through ensuring the optimal use of land space allied to the provision of new river berths at the north-eastern part of the DPC estate at Dublin Port.

The MP2 Project site is approximately 57 hectares and is located in the north-eastern part of the port estate, water bound to the north and east by the Tolka Estuary, and to the south by the Dublin Harbour. West of the site are existing port operations including facilities for the importation of petroleum products. Current activities on the site include existing ferry terminals, parking, loading and waiting areas, oil berth and ancillary facilities, as well as the storage of transit containers.

The proposed landside elements of the MP2 Project comprise

- A unified ferry terminal, incorporating existing Terminals 1, 2 and 5.
- Reconfiguration of existing roadways, buildings and lands to create an additional three hectares of usable terminal area.
- A new unified set of "in-gates" north of the existing terminal area accessed from the permitted Promenade Road Extension.
- A new ferry terminal building constructed overlooking the Tolka Estuary.
- Facilities for border control purposes for State Services (Revenue, Immigration and Agriculture).
- The expansion of an existing container terminal in terms of both berthage and land for the transit storage of imported and exported containers from Lo-Lo container ships.
- The marine side works forming the MP2 Project include:
- A new open jetty to provide a fifth Ro-Ro berth at the eastern end of the port
- Extensions and changes to existing berths (Berths 50A and Oil Berth 3)
- Infilling of existing Oil Berth 4
- Capital dredging works at the new berths to create berth pockets and areas for ships to manoeuvre on and off the berths

A drawing showing the layout of the MP2 Project is included in Appendix 2.

3.3 COMAH Establishments

3.3.1 Overview

The COMAH establishments within the Port (on the north side of the River Liffey) are listed in Table 1 and shown on the drawing in Appendix 1. Most of these establishments store petroleum products (eight of the ten establishments). Of the remaining two, one stores and distributes LPG (Calor), and the other (Indaver) operates a hazardous waste facility.

Table 1: COMAH Establishments in Vicinity of MP2 Project[3]

Establishment	Location	Tier	Activity	Consultation Distance[4]
Calor Teoranta	Tolka Quay Road, Dublin 1	Upper	LPG storage & distribution	600 m
Fareplay Energy Ltd. (under the Topaz Energy Group)	Tankfarm 1, Alexandra Road, Dublin Port, Dublin 1 Tankfarm 2, Tolka Quay Road, Dublin Port, Dublin 1	Upper	Oil storage & distribution	400 m
Indaver Ireland Ltd.	Tolka Quay Road, Dublin Port, Dublin	Upper	Hazardous waste	700 m
Tedcastles Oil Products	Yard 1, Promenade Road, Parish of St. Thomas, Dublin Port, Dublin 1	Upper	Oil storage & distribution	400 m
Tedcastles Oil Products	Yard 2, Tolka Quay Road, Parish of St. Thomas, Dublin Port, Dublin 1	Upper	Oil storage	400 m
Valero Energy Ireland Ltd.	Alexandra Road, Dublin Port, Dublin 1	Upper	Oil storage & distribution	400 m
Electricity Supply Board	North Wall Generating Station, Alexandra Road, Dublin 1	Lower	Oil storage	300 m
Iarnród Éireann [5]	Alexandra Road, North Wall, Dublin 1	Lower	Oil storage	300 m
Topaz Energy Limited [6]	Terminal 1, Alexandra Road, Dublin Port, Dublin 1	Lower	Oil storage & distribution	400 m
Topaz Energy Limited	Yard 3, Alexandra Road, Dublin Port, Dublin 1	Lower	Oil storage	300 m

There are also three COMAH establishments on the south side of the River: the two National Oil Reserves Agency (NORA) upper tier establishments at Ringsend and Poolbeg, and the Dublin Bay Power lower tier establishment. The NORA Ringsend establishment stores Class III petroleum, the NORA Poolbeg establishment (which is being refurbished) will store Class II and Class III petroleum, and the Dublin Bay Power establishment stores Class III petroleum as a backup fuel for its natural gas

[3] The HSA publishes details of upper tier and lower tier establishments on its website, www.hsa.ie.

[4] The Dublin City Development Plan 2016 – 2022 includes the consultation distances for the COMAH establishments.

[5] The HSA's list of COMAH establishments and the Public Information notices under Regulation 25 (available on the HSA website) refer to the registered name of the operator as Iarnród Éireann.

[6] In April 2018, Topaz was rebranded as Circle K. However, the HSA's list of COMAH establishments and the Public Information notices under Regulation 25 (available on the HSA website) refer to the registered name of the operator as Topaz Energy Group.

supply. The potential impacts from a major accident at any of these three establishments are not significant at receptors in the north of the Port and therefore they have been screened out of the assessment described in Section 4.

3.3.2 Calor Gas

The Calor establishment comprises seventeen aboveground and four semi-mounded LPG tanks, together with a road tanker loading facility from which LPG is distributed to domestic, commercial and industrial consumers via road tanker. The site is divided in two by Tolka Quay Road. The bulk storage installation and bulk breaking facilities are located on the northern half of the site, and the southern half of the site accommodates the administration building and services building (the workshop and garage).

The storage vessels are located on the northern half of the site. Of the 21 tanks, 17 are aboveground tanks (two of which are not in service), and the remaining four tanks are located to the north west of the northern part of the site and are semi-mounded. The road tanker loading area is located to the east of the northern part of the site.

3.3.3 Indaver Ireland

Indaver operates a hazardous waste facility for blending and transhipment of solvent wastes, and for receipt, storage and transfer of packaged wastes to other waste facilities in Ireland and abroad for disposal / recovery / recycling. The facility is located to the north of Tolka Quay Road at the junction with Fire Access Road (opposite Breakwater Road North), and to the west of the Calor establishment. The facility comprises a solvent blending tank farm to the northeast of the site, and several warehouses for the storage of packaged wastes to the west of the site.

3.3.4 Oil Storage & Distribution Facilities

The oil storage sites, other than ESB and Iarnród Éireann, store a variety of petroleum products (Classes[7] I, II and III) and distribute them via road tanker. ESB has the capacity to store Class III petroleum (gas oil) as a backup fuel for the North Wall Generating Station, while Iarnród Éireann stores Class III petroleum (diesel) for distribution to its regional depots via road tanker.

3.3.5 Planning Permissions

Table 2 summarises the recent planning history for the current and prospective COMAH establishments and identifies COMAH-related developments for which planning permission has been granted but which have not yet commenced or are not yet operational.

[7] Petroleum products are classified as Class I, Class II or Class III depending on their flash point (the minimum temperature at which a liquid, under specific test conditions, gives off sufficient flammable vapour to ignite momentarily on the application of an ignition source). Class I products include gasoline / petrol, Class II products include kerosene, and Class III products include diesel / gas oil

Table 2: Planning Permissions for COMAH Establishments

Establishment	Reference	Description	Status
Fareplay Energy Ltd., Yard 2	1460/08	The development will consist of: (in the area of waste ground located at the northern end of the yard) the construction of a retention bund with reinforced concrete base and walls, construction of two above ground vertical steel petroleum products storage tanks and installation of associated equipment including; pipework, pumps, access platforms, fire monitors and underground interceptor within the confines of the bund. The tanks will comprise of 5171 tes motor spirit tank, 26.42 metres diameter by 14.63 metres high and, a 8139 tes auto diesel tank, 30.06 metres diameter by 14.63 metres high. Preparation of the waste ground for construction of the concrete bund, tanks and their foundations will require digging and/or removal of existing ground material in the area. The development will raise Yard 2 form an S.I. 74 of 2006, European Communities (Control Of Major Accident Hazards Involving Dangerous Substances) Regulations 2006, 'lower tier' establishment to an 'upper tier' establishment.	Final grant of permission on 03-Dec-08
Tedcastles Oil Products, Yard 2	1761/08/x1	The development consists of: the construction of a new above ground vertical, steel petroleum product storage tank located at the North end of the existing bund in Yard 2 for Class 1 motor spirit, 9600 tes, 33 m dia × 4.8 m high. The installation of new pipe work, pumps, fire defence system and associated works	Extension of time to 16-Jan-19
Tedcastles Oil Products, Yard 1	3820/08/x1	Planning permission for development outlined hereunder. The development will consist of: The construction of a new bund in the North end of Yard 1, 35 m × 40 m × 0.3 m high, including all associated works to prepare ground and construct foundation. The construction of a new above ground, vertical, double skinned, steel petroleum product storage tank located within the newly constructed bund in Yard 1 for Class II Kerosene, 6283 tes, 26.5 m dia × 14.6 m high with an outer shell 30.5 m dia × 12.5 m high. The installation of new pipework, pumps, fire defence system and associated works.	Extension of time to 13-Aug-19

Establishment	Reference	Description	Status
Topaz Energy Limited	3221/14	Permission for development at New Topaz Terminal, Promenade Road, Dublin Port, Dublin 3, bounded to the south by Tolka Quay Road, to the west by TOP Yard 2, and to the east by an access lane. The development will consist of modifications to previously approved planning permission, Reference 3171/12. The modifications will consist of the following: 1. Re-designation of Tank 6 (T406) to store Jet A 1/Kerosene instead of Ethanol; 2. Re-designation of Tanks 7 and 8 (T407 and T408) to store ethanol instead of unleaded gasoline (ULG); 3. Tanks 1, 2, 3, 4, 5 and 6 to be located in one Bund instead of two bunds; 4. Tanks 7, 8 and 9 to be double-skin tanks with a single bund wall instead of single-skin tanks with two bund walls; 5. Deletion of the 3m high secondary containment (inner) concrete wall around Tanks 7, 8 and 9; 6. Reduction of the height of the tertiary containment concrete walls of the bunds and of the perimeter walls from 3 metres to 2 metres. There will also be palisade fencing on the boundary. These changes will reduce the storage capacity for Class I liquids by approximately 30 %. The total storage capacity of all hydrocarbons will be unchanged. The development will be an Upper Tier Seveso site and comes within the meaning of Part 11 of the planning regulations. An Environmental Impact Statement and a Natura Impact Statement will be submitted to the planning authority with the planning application and the EIS and NIS will be available for inspection or purchase.	Final grant of permission on 14-Nov-14

The development at the Fareplay Yard 2 has not been progressed and the planning permission has not been extended and has, accordingly, ceased to have effect; therefore, this development has not been included in this assessment.

Construction on the development at Tedcastle Oil Products Yard 1 has commenced, and the permission for the development at Yard 2 has been extended to August 2019, and therefore both developments are included in this assessment.

The development of the proposed new Topaz Energy Limited[8] terminal has not commenced and the timeframe for the planning permission has not expired[9]. However, the area for the proposed development of the terminal has since been developed under separate planning permission (reference 2429/17), comprising:

> *The demolition of 3 no. existing buildings comprising Building A (c. 283 sq.m), Building B (c. 303 sq.m) and Building C (c. 112 sq.m) and removal of all structural and infrastructural elements, vegetation, plinths, fences etc; new concrete surface treatment across entire site including underground drainage and electricity infrastructure; 4 no. CCTV (approx. 18m); new lighting (including 6 no. lighting towers (approx. 30 m)); new approx. 4 m high security fence*

[8] In April 2018, Topaz was rebranded as Circle K.

[9] The grant of permission does not specify a period for the duration of the permission and therefore we have interpreted the appropriate period under Section 40(3)(b) of the Planning & Development Act 2000, as amended (five years from the date of grant).

> *to northern, eastern and southern (Tolka Quay Road) boundaries; and new substation. An existing substation on site will be retained. The development also includes the closure of the existing (eastern) vehicular entrance and widening of the existing western entrance to provide a 12 m sliding gate on Tolka Quay Road. All development to take place on site of approx. 2.8 hectares.*

The planning inspector's report noted that the area had been subject to previous planning applications, including for the construction of the new terminal. While the planner inspector's report makes no reference to the expiration, or otherwise, of the planning permission for the terminal, it notes the following in relation to the use of the area under the latest development:

> *It is assumed from the layout and nature of the proposed development is likely to be a Lo/Lo container park facility.*

Based on the latest development of this part of Dublin Port, the information provided in the planning application for the development, and the information set out in the planning inspector's report, we consider that it is unlikely that the Topaz Energy Limited terminal will be developed under the current planning permission (3221/14) given the anticipated expiration in November 2019. Nonetheless, based on our understanding of the HSA's requirements for COMAH land use planning assessments, the development of the new Topaz terminal has been included in this assessment.

3.4 Port & Surrounding Population

3.4.1 Overview

The population within Dublin Port comprises:

- workers at the respective industrial and commercial sites (at both the COMAH establishments and non-COMAH facilities)
- vehicle traffic using the Port road network, which includes:
    - workers commuting to and from their place of work within the port
    - goods vehicle drivers that operate to / from the port, including those associated with:
        i. direct Port activities (e.g. delivering / collecting cargo, such as containers or trailers, shipped to / from the Port)
        ii. import / export related activities from facilities within the Port (e.g. fuel distribution from the oil / LPG facilities that import oil / LPG, car distributors that import vehicles for sale on the Irish market, waste facilities that collect / blend hazardous wastes for export)
    - non-Port related activities that are located within the Port estate
- HGV and passenger vehicle traffic departing from / arriving at the Ro-Ro / ferry terminals, together with private and public transport serving the cruise liner traffic
- other traffic that may access parts of the road network (primarily the western end of the Port), for example the service station at the junction of Promenade Road and Bond Drive Extension
- shipping traffic at the berths along the north and south quays
- cruise liner passengers (and crew) arriving at / departing from the cruise liner berths

- passengers arriving / departing on the ferries operating from Terminals 1 & 2 (and the eastern end of the Port)
- HGV / goods traffic arriving / departing on the ferries operating from Terminals 1, 2, 3 / 4 and 5

There are also several residential areas to the north and west of the Port estate, at Clontarf and East Wall; these areas are approximately 400 m to 750 m from the northern and western parts of the Port estate and are at least 800 m from the MP2 Project.

To assess the societal risk presented by the COMAH establishments in the Port it is necessary to quantify the population that may be exposed to potential major accidents.

For certain types of population, estimating the number of people that may be exposed is relatively straightforward, as the number of people is known (e.g. from census data) and there is little or no temporal or spatial variation (the population is present at a fixed location for a discernible proportion of time). The residential populations to the north and west of the Port fall into this category, as do the populations at the commercial and industrial facilities to a lesser extent.

Other populations, however, are more difficult to characterise and quantify as they vary in terms of:

- the number of people present at any one time (e.g. the number of passengers on a ferry)
- the location of the people (e.g. people using the road network)
- when people are present, which can vary over the course of a day, week and year (e.g. peak and off-peak traffic patterns, non-regular shipping & cruise berthing, and intermittent embarkation / disembarkation at the passenger ferry terminals).

Both the road traffic and, to a lesser extent, the ferry and shipping traffic, fall into this latter category, as these populations are both transient and mobile.

Nonetheless, for this assessment we have examined the population data available from Dublin Port and the Central Statistics Office, and have quantified the number of people that may be exposed to potential major accident hazards at the COMAH establishments.

In the following sub-sections, we describe the source of the population data we have used in our assessment, how we have characterised and quantified the populations, and our assessment of the conservative nature of the assumptions we have made. The objective of this exercise is to develop a representative population for the Port and surrounding area, rather than to develop a detailed population and transport model. The population data used in this assessment is summarised in Appendix 3.

3.4.2 Timeframes

Table 3 summarises the timeframes that we have used to characterise the population within and around the Port.

Table 3: Population Timeframes

Category	Period	Hour/day	Day/week	Hour/week	% of time
Daytime peak traffic	09:00 – 17:00	8	5	40	23.8%
Daytime off-peak traffic	n/a	0	5	0	0.0%
Non-daytime peak traffic	07:00 – 09:00 17:00 – 19:00	4	5	20	11.9%
Non-daytime off-peak traffic	19:00 – 07:00	12	5	60	35.7%
Weekend peak traffic	07:00 – 19:00	12	2	24	14.3%
Weekend off-peak traffic	19:00 – 07:00	12	2	24	14.3%
Other timeframes	Other timeframes for certain populations based on, for example, ferry timetables, berth occupancy data, and other non-standard occupancies that do not fit within the other six categories. The other timeframes are apportioned across the other six categories on a pro-rata basis. For example, if a shipping berth is occupied, on average, for 40% of the year, this occupancy is apportioned between the other six timeframes at the corresponding percentages (23.8%, 0%, 11.9%, 35.7%, 14.3% & 14.3%)				
Total	-	-	-	168	100%

3.4.3 Residential Areas

The closest residential areas to the northern and western parts of the Port are:

- To the north, in Clontarf along Clontarf Road and the adjoining roads (approximately 625 m to the north across the River Tolka Estuary). This area also includes:
  - residential buildings (houses and apartments)
  - a school (Holy Faith Secondary School)
  - a church (Church of St. John the Baptist)
  - a convent (Convent of the Holy Faith)
  - a presbytery (St. John the Baptist Presbytery)
  - Clontarf Yacht & Boat Club
  - Clontarf Lawn Tennis Club
  - Dublin Bus garage
- To the west, in East Wall to the west and south of East Wall Road (approximately 200 m from the western boundary of the Port estate, 550 m from the nearest COMAH establishment, and approximately 2 km from the MP2 Project).

The latest population data from the CSO is from the 2016 census, with population data available at a variety of geographic levels:

- Constituency
- County
- Electoral Division
- Gaeltacht Area
- Limistéir Pleanála Teanga (Language Planning Areas)
- Local Electoral Area
- Province
- NUTS3 Region
- Settlement
- Small Area

For the residential population around the Port we have used the data from the Small Areas; these are areas of population generally comprising between 80 and 120 dwellings and are designed as the lowest[10] level of geography for the compilation of statistics. There are 18,641 Small Areas from the 2016 census, 67[11] of which are within approximately 2 km of the nominal centre of risk from the COMAH establishments in the north Port and have been used in this assessment.

3.4.4 Commercial & Industrial

Based on the 2016 census data, the CSO has published data on the 'day-time population' of areas, referred to as workplace zones. The day-time population includes everyone who indicated they worked or studied in the area, along with persons in that area who do not work or study (and are therefore there during the day). These zones were created by the CSO by amalgamating and / or splitting the Small Areas output from the census.

There are four workplace zones covering the COMAH establishments and surrounding areas in the northern part of the Port estate, and while they provide an indication of the population during daytime hours, they do not lend themselves to characterising the Port population to assess the societal risk as they cover too large an area. We have therefore used population survey data provided by DPC, which includes an estimate of both indoor and outdoor populations. The total daytime population from DPC's data is approximately 1,140, excluding the transient populations (passengers) at the ferry terminals.

[10] The CSO describes Small Areas as "the lowest level of geography for the compilation of statistics in line with data protection". In urban areas, with a relatively high population density, Small Areas also represent the *smallest* (in area) level of geography.

[11] One of the Small Areas – 268108026 / 268108027 – covers the area occupied by the DPC estate and has a population of 922 people. However, the residential population assigned to this Small Area is located outside the DPC estate and therefore we have centred this Small Area outside the Port estate.

3.4.5 Road Traffic

In 2016, DPC commissioned several traffic surveys to identify and quantify the number and type of vehicles using the road network within the Port. The surveys included traffic counts over 24-hour periods at nineteen locations across the Port, providing profile data for cars, goods vehicles (light and heavy), buses, motorcycles and bicycles. Additional traffic counts were carried out to quantify the number of vehicles using the Port's roads during the peak hours of the day (07:00 to 08:00 and 17:00 to 18:00).

The purpose of the traffic surveys was to characterise and quantify the volume of traffic, rather than to quantify the number of people within the Port, and therefore it did not include the occupancy of the vehicles. Therefore, to quantify the number of people that may be present in vehicles using the Port, we have assumed the following (summarised in Table 4):

- Car traffic accounts for workers. Data from Dublin City Council and the National Transport Authority shows that the average car occupancy is 1.2 per vehicle[12]. We have therefore assumed that the weighted average occupancy is 1.2 people per car, equivalent to 1.26 people per car during peak times and 1 person per car during off-peak times (refer to Table 4):

$$Average\ Occupancy = Occ_{PEAK} \times Freq_{PEAK} + Occ_{OFFPEAK} \times Freq_{OFFPEAK}$$

$$1.2 = 1.26 \times 77.3\% + 1.00 \times 22.7\%$$

- The car traffic associated with the ferry terminals is accounted for under the ferry traffic data in Section 3.4.8.
- Goods vehicles (LGV, OGV1 and OGV2) are assumed to have a driver and no passengers.
- Buses accessing the port include Dublin Bus serving the ferry terminals (typically a double decker bus with a capacity up to 95 passengers), and private coach services (typically with a capacity up to 55 passengers) either serving the ferry terminals / cruise liners or arriving / departing on the ferries.

However, as the majority of passengers using the public or private bus services are arriving or departing passengers, they are accounted for in either the cruise liner traffic or ferry traffic data (refer to Sections 3.4.7 and 3.4.8 respectively), and they are therefore not included in the road traffic population data. This eliminates / minimises the potential for double counting of the same population.

- Cars and motorcycles travel at an average of 90% of the speed limit (50 km/h) during off-peak (quiet times) and at an average of 75% of the speed limit during peak times.
- Goods vehicles and large passenger vehicles travel at an average of 75% of the speed limit during off-peak times and at an average of 50% of the speed limit during peak times.
- Bicycles travel at an average speed of 10 km/h.

[12] *Report on trends in mode share of vehicles and people crossing the Canal Cordon, 2006 to 2014.*

Table 4: Vehicle occupancy, average speed & breakdown by peak/off-peak times

Vehicle type	No. Occupants		Average speed (km/h)		% of total traffic		% of traffic		
	Peak	Off Peak	Peak	Off Peak	Peak	Off Peak	Peak	Off Peak	Total
Car	1.26	1	37.5	45	59.4%	59.5%	77.3%	22.7%	**100%**
LGV	1	1	25	37.5	7.9%	5.6%	82.7%	17.3%	**100%**
OGV1	1	1	25	37.5	5.9%	6.8%	74.7%	25.3%	**100%**
OGV2	1	1	25	37.5	19.9%	22.2%	75.3%	24.7%	**100%**
Bus	-	-	25	37.5	3.8%	3.3%	79.9%	20.1%	**100%**
Motorcycle	1	1	37.5	45	1.5%	1.3%	80.0%	20.0%	**100%**
Bicycle	1	1	10	10	1.6%	1.3%	80.2%	19.8%	**100%**
Total	**-**	**-**	**-**	**-**	**100%**	**100%**	**-**	**-**	**-**

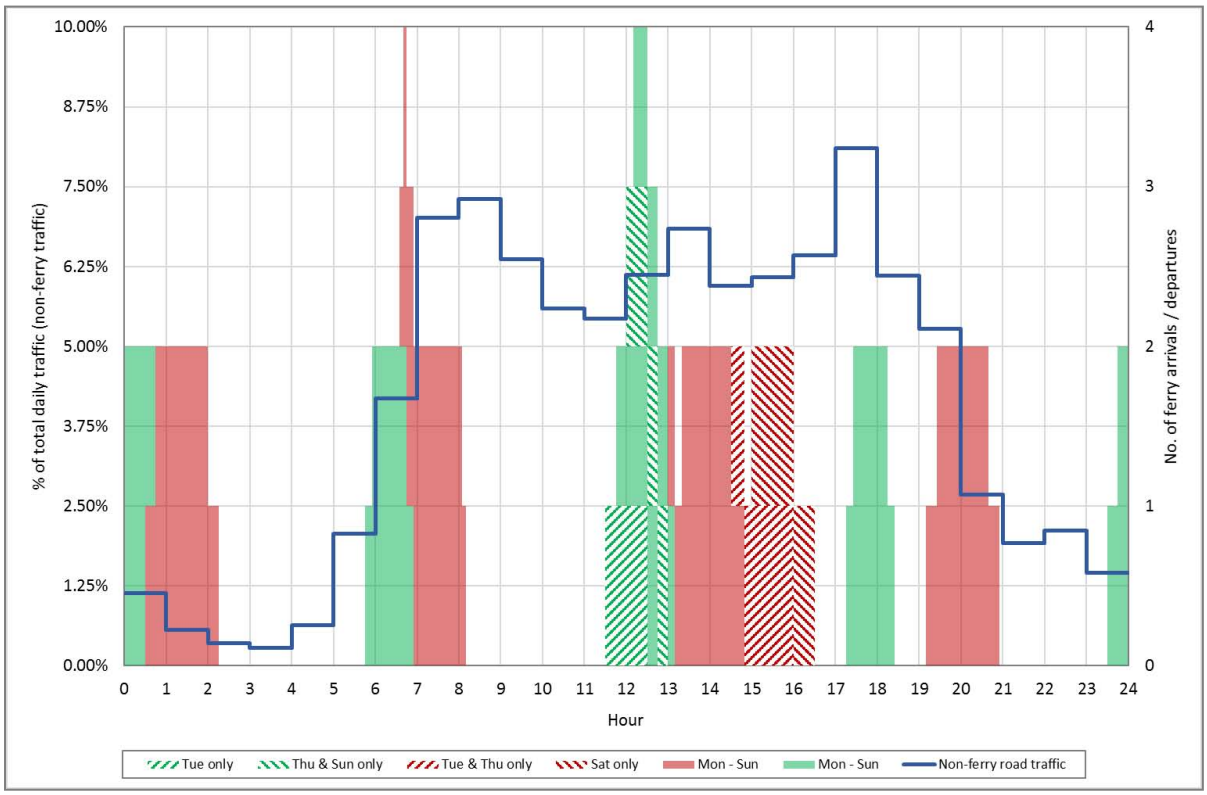
During peak times there are approximately 85 people in vehicles on the Port roads at any one time, and during off-peak times there are approximately 16 people in vehicles at any one time, excluding vehicle traffic departing from / arriving at the ferry terminals (refer to Section 3.4.8).

The detailed results from the traffic surveys are incorporated into the assessment of the potential impact on people using the Port. The general profile of traffic within the Port over a 24-hour period is shown in Figure 1, together with the ferry departure and arrival timeframes for Irish Ferries and StenaLine via Terminals 1 & 2 (the main passenger ferry terminals), shown in red and green, respectively. Figure 1 shows, for example:

- that two ferries arrive every day of the week (one at 05:45 and one at 05:55) and that vehicles disembark the ferries between 05:45 and 06:55 (assuming a 1-hour disembarkation time for each ferry).
- that two ferries depart every day of the week (one at 20:40 and one at 20:55) and that vehicles start to arrive in the Port 90 minutes before the departure times (starting at 19:10).

The timetables for the operators at Terminals 1, 2 and 5 are summarised in Table 7 in Section 3.4.8.

Figure 1: Typical 24-hour traffic profile in Dublin Port



3.4.6 Shipping Traffic

Data from DPC shows that there were appropriately 8,000 vessel arrivals and departures (approximately 16,000 vessel movements, excluding movements between berths) in the Port in 2018, comprising RoRo passenger vessels (ferries), cruise liners, bulk carriers, container vessels, general & Ro-Ro cargo ships, oil & LPG tankers, vehicle carriers, and a wide range of other vessels. Passenger ferries accounted for approximately half of all vessel movements, with RoRo cargo vessels accounting for approximately 20%, container vessels accounting for approximately 13%, and oil/LPG tankers accounting for approximately 6.5%. The population associated with the shipping traffic (excluding cruise liners and passenger ferries, which are accounted for in Sections 3.4.7 and 3.4.8, respectively) is summarised in Appendix 3.

3.4.7 Cruise Liners

During 2018, approximately 155 cruise liners berthed in the Port, comprising 65 different vessels ranging in capacity from 87 (the Hebridean Princess) to 6,036 (the MSC Meraviglia). Data from DPC shows that a total of 177,641 cruise liner passengers visited the Port during the year, with the peak visitor numbers during the second (27.5%) and third (37.7%) quarters.

The majority of cruise liners berthed at Ocean Pier 33 (approximately 41%) and Cruise 18 (approximately 25%), with the remainder berthing at Alexandra Basin East 39, Alexandra Basin West 30, D.L.2, D.L.4, Deep Water Berth 46, Ocean Pier 35, Ocean Pier 36, Ocean Pier 37, Sir JRQ 8 and SJR Quay 9. Ocean Pier 33 is approximately 1.2 km southwest of the MP2 Project and 360 m southwest of the nearest COMAH establishment (the class III storage tanks at ESB Northwall). Cruise 18 is located to the east of the Eastlink Bridge, approximately 1.9 km west-southwest of the MP2 Project and approximately 850 m southwest of the nearest COMAH establishment (Topaz Yard 1).

The estimated cruise liner population is summarised in Appendix 3. For the assessment of societal risk, it is conservatively assumed that the passengers remain onboard while the vessel is berthed; due to the distance between the cruise liner berths and the sources of risk at the COMAH establishments, this assumption does not have a significant impact on the assessment.

3.4.8 Ferry Traffic

There are four ferry terminals within the Port, summarised in Table 5.

Table 5: Dublin Port Terminals

Terminal	Operator	Traffic
1	Irish Ferries Isle of Man Steam Packet Company (seasonal)	Passenger & Ro-Ro Passenger
2	StenaLine	Passenger & Ro-Ro
3	P&O Ferries	Predominantly Ro-Ro, with some passenger
5	Seatruck Ferries	Ro-Ro

Terminals 1, 2 and 5 for Ro-Ro traffic, including passenger ferries, are located at the eastern end of the Port and are accessed via the main entrance on East Wall Road on to Promenade Road. As access to these terminals is via Tolka Quay Road, all ferry traffic passes the majority of the COMAH establishments on Promenade Road / Tolka Quay Road / Alexandra Road. Terminal 3 is located at the western end of the Port and is accessed via a dedicated gate on East Wall Road north of the East Link Toll Bridge.

Table 6 summarises the services operating from Terminals 1, 2 and 5 (the most relevant terminals for this COMAH land use planning assessment); the passenger traffic associated with the cruise liners is included under the shipping traffic data in Section 3.4.7.

Table 6: Summary of Dublin Port Ferry Services

Operator	Vessel	Destination	Capacity		Weekly sailings (peak) (arrivals + departures)
			Passengers	Cars	
Irish Ferries	Ulysses	Holyhead	1,875	1,342	28
	Epsilon	Holyhead	500	70	18
	Swift	Holyhead	900	251	28
	Epsilon	Cherbourg	500	70	2
	W.B. Yeats Note 1	Cherbourg	1,885	1,200	4
StenaLine	Adventurer	Holyhead	1,500	500	28
	Superfast	Holyhead	1,200	500	28
P&O Note 1	Norbank / Norbay	Liverpool	114	Note 3	18
	Mistral Note 2	Liverpool	12	Note 3	18

Operator	Vessel	Destination	Capacity		Weekly sailings (peak) (arrivals + departures)
			Passengers	Cars	
Seatruck Note 1	FSG / P / R class	Liverpool	12	Note 3	32
	FSG / P / R class	Heysham	12	Note 3	11
Isle of Man Note 4	Manannan	Douglas	850	200	2
	Ben-my-Chree	Douglas	630	275	2

Note 1: The W.B. Yeats entered service in January 2019.

Note 2: In April 2019, P&O Ferries sold the European Endeavour, which had operated on the Dublin-Liverpool route. The service has been replaced by the Mistral.

Note 3: P&O's and Seatruck's service is predominantly for freight (accompanied and unaccompanied HGVs / trailers) with little or no capacity for passenger vehicles.

Note 4: The Isle of Man Steam Packet Company operates a seasonal (summer) service from Terminal 1.

Table 7: 2018 Timetables for Terminals 1, 2 and 5 (arrival & departure times in Dublin Port)

Operator	Route	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Irish Ferries	Dublin – Holyhead	02:00	02:00	02:00	02:00	02:00	02:00	02:00
		08:05	08:05	08:05	08:05	08:05	08:05	08:05
		14:30	14:30	14:30	14:30	14:30	14:30	14:30
		20:55	20:55	20:55	20:55	20:55	20:55	20:55
	Holyhead – Dublin	05:55	05:55	05:55	05:55	05:55	05:55	05:55
		11:45	11:45	11:45	11:45	11:45	11:45	11:45
		17:25	17:25	17:25	17:25	17:25	17:25	17:25
		23:30	23:30	23:30	23:30	23:30	23:30	23:30
	Dublin – Cherbourg	-	16:00	-	16:00	-	16:30	-
	Cherbourg – Dublin	11:30	-	-	12:00	-	12:00	-
Stena	Dublin – Holyhead	02:15	02:15	02:15	02:15	02:15	02:15	02:15
		08:10	08:10	08:10	08:10	08:10	08:10	08:10
		14:50	14:50	14:50	14:50	14:50	14:50	14:50
		20:40	20:40	20:40	20:40	20:40	20:40	20:40
	Holyhead – Dublin	05:45	05:45	05:45	05:45	05:45	05:45	05:45
		12:10	12:10	12:10	12:10	12:10	12:10	12:10
		17:15	17:15	17:15	17:15	17:15	17:15	17:15
		23:45	23:45	23:45	23:45	23:45	23:45	23:45
Seatruck		15:30	06:00	06:00	06:00	06:00	09:30	20:30

Operator	Route	Mon	Tue	Wed	Thu	Fri	Sat	Sun
	Dublin – Liverpool	21:00	09:30	09:30	09:30	09:30	18:00	-
		-	15:30	15:30	15:30	15:30	21:00	-
		-	21:00	21:00	21:00	21:00	-	-
Seatruck (cont/d)	Liverpool – Dublin	05:00	02:00	02:00	02:00	02:00	02:00	06:00
		-	05:00	06:00	06:00	06:00	06:00	20:00
		-	11:30	12:30	12:30	12:30	17:00	-
		-	17:30	17:30	17:30	17:30	-	-
	Dublin – Heysham	13:30	13:30	13:30	13:30	13:30	13:30	-
	Heysham – Dublin	-	10:30	10:30	10:30	10:30	10:30	10:30
IOM Steam Packet	Dublin – Isle of Man	11:30	11:45	-	10:45	-	-	-
	Isle of Man – Dublin	-	11:05	-	10:20	-	-	10:20

The largest passenger ferries operating regularly to / from the Port are the W.B. Yeats with a capacity of 1,885 passengers, and the MV Ulysses with a capacity of 1,875 passengers, with the slightly larger MS Isle of Inishmore (2,200 passengers) occasionally operating to / from the Port. The other ferries have passenger capacities of between 110 and 1,800 passengers.

Data from DPC for 2017 shows that approximately 1.8 million passengers and 488,000 tourist vehicles passed through Terminals 1 & 2 (approximately 50% arriving and 50% departing), yielding an average vehicle occupancy of 3.67. In addition, approximately 458,000 HGVs passed through Terminals 1 & 2, approximately 60% of which were accompanied (with the driver present) and 40% of which were unaccompanied (with only the trailers present, loaded onto / removed from the ferry by tug / shunter).

Figure 2 shows the seasonal trend in HGV (blue) and tourist (red) vehicle arrivals (dark) and departures (light). Figure 3 shows the corresponding number of people (HGV drivers and tourists / passengers) arriving and departing.

To account for the transient and mobile ferry passenger population in the assessment of societal risk, we have assumed that:

- For departures, the majority of vehicles start to arrive at the terminals approximately 90 minutes prior to the sailing, and they travel at an average of 50% of the speed limit (25 km/h). This yields a certain number of people on the road network at any one time over a 90-minute period; the balance of the passengers travelling on the ferry are assumed to be located at the check-in / assembly area at the terminal. In practice, the number of passengers at the check-in / assembly area will vary over the period, starting from zero and increasing to the ferry complement; our approach is therefore conservative.
- For arrivals, it takes up to 60 minutes for all traffic to disembark the ferry and exit the Port, again assuming that the vehicles travel at an average of 50% of the speed limit. This yields a certain number of people on the road network at any one time over a 60-minute period; the balance of the passengers arriving on the ferry are assumed to be located at the ferry. As in

the case of ferry departures, our approach to characterising the transient and mobile population is conservative.

Figure 2: Vehicle arrivals and departures (2017)

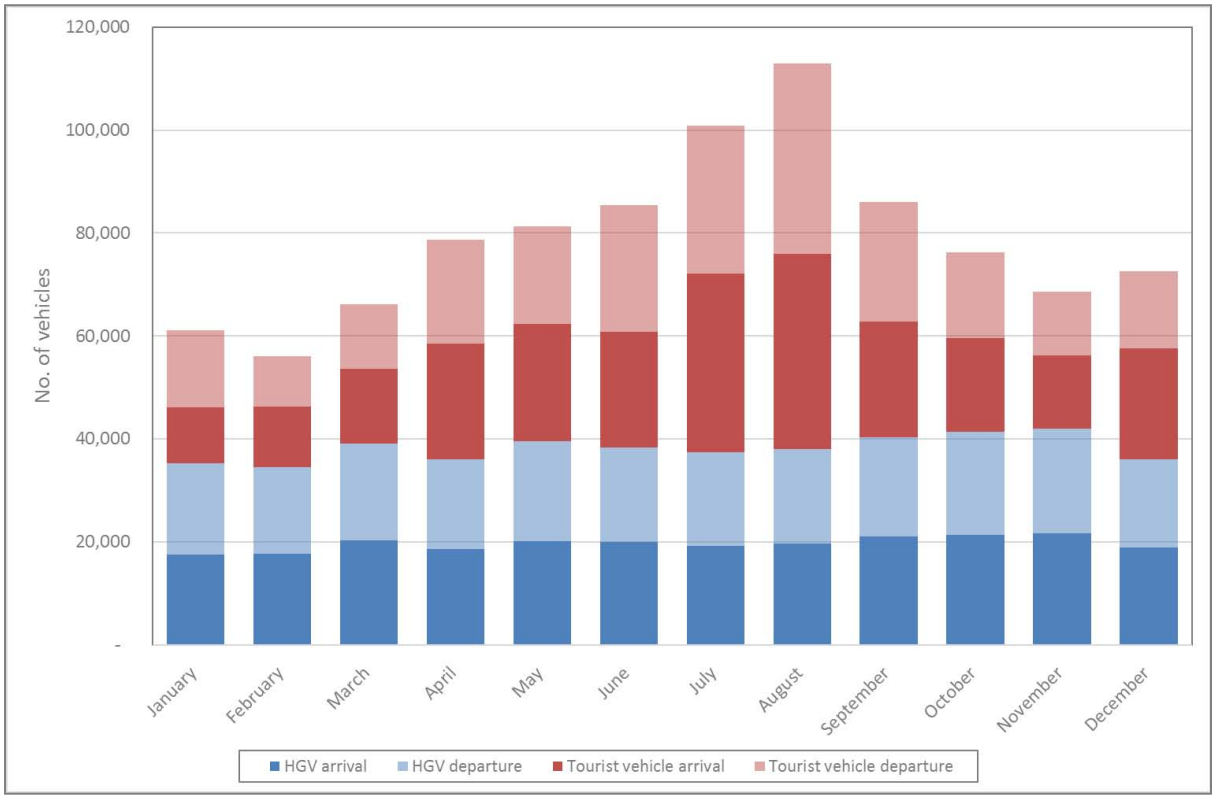
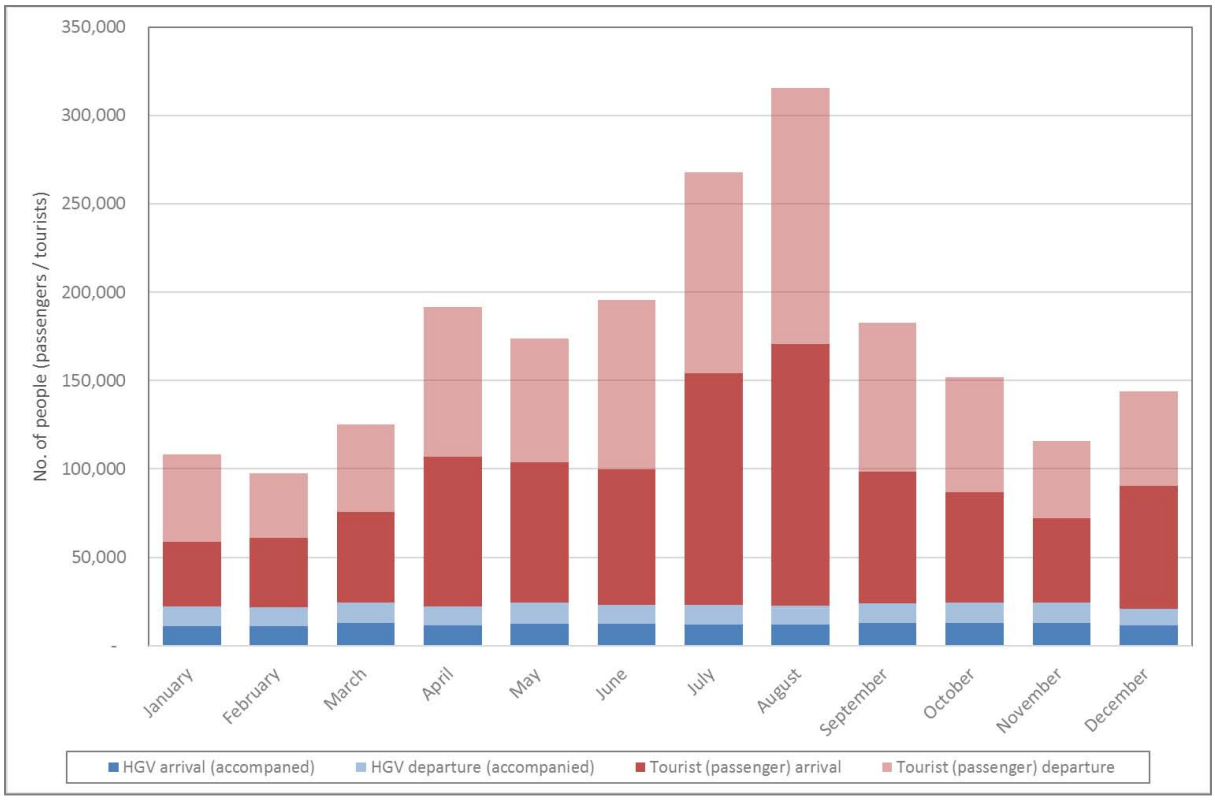


Figure 3: Passenger / tourist number arrivals and departures (2017)



4 ASSESSMENT METHODOLOGY

4.1 Guidance on Land Use Planning

4.1.1 EU Guidance

The EU's guidelines on land use planning[13] describe the ideal LUP technical advice system:

> *In principle all risk assessment methods without regard to individual applications have the same relevant elements; these are:*
>
> - *Definition of scope, objectives and risk criteria*
> - *Description of the object or area of concern*
> - *Identification of hazards*
> - *Identification of vulnerable targets*
> - *Assumption of source terms or hazardous incidents*
> - *Development of escalation scenarios*
> - *Estimation of consequences*
> - *Estimation of likelihood*
> - *Presentation of resulting risk and comparison with established tolerability criteria*
> - *Identification of mitigation measures*
> - *Acceptance of result, modification or abandoning*
>
> *Besides these elements a proper risk assessment should furthermore ensure*
>
> - *A level of detail proportional to the severity of consequences*
> - *The use of acknowledged methods (or it must be demonstrated that these are equivalent)*
> - *Reliability of data and relevant information and*
> - *Transparency of the process*

The HSA has set out its policy and approach to conducting land use planning assessments in its guidance: *Policy & Approach of the Health & Safety Authority to COMAH Risk-based Land-use Planning (19 March 2010)*.

4.1.2 HSA Guidance

The HSA has set out its policy and approach to conducting land use planning assessments in its guidance[14]. The HSA's methodology is to adopt a conservative and consistent approach. For new COMAH establishments, the HSA requires a quantified risk assessment (QRA) to be carried out to

[13] *Land use Planning Guidelines in the Context of Directives 96/82/EC and 105/2003/EC*

[14] *Policy & Approach of the Health & Safety Authority to COMAH Risk-based Land-use Planning* (19 March 2010)

support the planning application. A QRA may also be necessary for planning applications that require further assessment of the societal risk, rather than relying on screening tools.

In its guidance, the HSA notes that:

> *The risk based approaches described here are not intended to be as detailed as those required for a full Quantified Risk Assessment, but are relatively simple approaches, based on the consideration of a smaller number of representative events which are the most significant in terms of off-site land use planning.*
>
> *… The policy of the HSA is that a simplified application of a risk based approach is the most appropriate for land use planning. The difficulties associated with the complexity of analysing many scenarios can be avoided by considering a small number of carefully chosen representative events, whose frequency has been estimated conservatively.*
>
> *A risk based approach inevitably involves some assumptions concerning the likelihood of events. This is considered to be preferable to the hazard based approach where it is implicitly assumed that the particular event chosen has a likelihood which is sufficient to be a cause for concern, but not so high as to make it unacceptable.*
>
> *The likelihoods of events and assumptions relating to probit relationships are estimated conservatively and consistently in our approach, resulting in a risk based approach that is robust and transparent.*

In carrying out this assessment, we have applied the approach set out in the HSA's guidance and have examined the likelihoods and consequences from the types of major accident that could arise at the different COMAH establishments (described in Section 4.3). In assessing the risk, the HSA examines both the individual risk (described in Sections 4.2.1 and 6.1) and the societal risk (described in Sections 4.2.2 and 6.2). In both cases, we have estimated the risk based on the HSA's guidance and have compared the risk against the HSA's assessment criteria.

4.2 Assessment Criteria

4.2.1 Individual Risk

The level of individual risk is assessed using a three-zone traffic light system shown in Table 8.

Table 8: Risk Based Contour Zones for Individual Risk

Zone	Risk of fatality per year		
Inner	1×10^{-5}	1 in 100,000	0.001%
Middle	1×10^{-6}	1 in 1 million	0.0001%
Outer	1×10^{-7}	1 in 10 million	0.00001%

These three zones have been determined for the COMAH establishments in the Port based on the scenarios identified in Section 4.3, and on the results from the consequence assessment as described in Section 6.1.

4.2.2 Societal Risk

4.2.2.1 Overview

Societal risk is a measure of the risk of large numbers of people being affected in a single accident[15]. The HSA's guidance notes that:

> *Societal Risk is examined as part of the assessment and this may be by the use of screening tools – such as the ARI as a screening tool in relation to the siting of new establishments. Where further assessment of societal risk is necessary, Expectation Value (EV) / Potential Loss of Life (PLL) or an FN curve will be used to determine the level of societal risk as considered appropriate. Where societal risk is in the intolerable region (an upper societal risk criterion value of 1 in 5000 for 50 fatalities will be used) the advice should be 'against', in the broadly acceptable region (1 in 100,000 for 10 fatalities) it should be 'not against' and in the significant risk region (which is between these 2 values) the planning authority should be advised of that fact and the need for the planning authority to weigh this into their planning decision, using Cost Benefit Analysis (CBA) and taking into account any socioeconomic benefits as necessary.*

The HSA also notes that:

> *There are relatively few widely accepted societal risk criteria for land use planning, as it is generally considered that, if the individual risks for particular types of development are adequately controlled, then the societal risks will also be controlled adequately. However, this is not always the case, particularly for hazards such as pipelines or some major toxic risks, where the societal risks may be significant even though the individual risks are relatively low.*

In this context, the HSA outlines several metrics for estimating and assessing societal risk:

- The Societal Risk Index (SRI), also referred to as the Scaled Risk Integral
- The Risk Integral (RI), which can be expressed in several forms:
  - The RI_{COMAH}, which is the form of the RI used when assessing COMAH establishments
  - The ARI_{COMAH}, the Approximate RI, which is used when assessing COMAH establishments, and is a simplified version of the RI_{COMAH}
  - The RI_{LUP}, which is the form of the RI for land use planning purposes
  - The ARI_{LUP}, which is the Approximate RI for land use planning purposes (a simplified version of the RI_{LUP})

Although the HSA's guidance does not describe the use of the EV, the PLL, or FN-curves for assessing societal risks, it recognises that such approaches may be appropriate. The application and relevance of these metrics to the societal risk attributable to the COMAH establishments in the Port, and to the MP2 Project, are described in the following subsections.

[15] Policy & Approach of the Health & Safety Authority to COMAH Risk-based Land-use Planning (19 March 2010)

4.2.2.2 Scaled Risk Integral

The Scaled Risk Integral (SRI) is described by Carter (1995)[16] and Hirst & Carter (2000)[17] as a derivative of the Risk Integral. It was developed for use when considering proposals for new developments close to existing (COMAH) establishments and takes the form:

$$SRI = \frac{P \times R \times T}{A}$$

Where:

P is the population factor, defined as $(n+n^2)/2$

n is the number of persons at the development

R is the average estimated level of individual risk (in 'chances per million', CPM)

T is the proportion of time the development is occupied by n persons

A is the area of the development (in hectares)

As the SRI is generally intended to be applied to non-COMAH developments in the vicinity of COMAH installations (establishments), it may be considered a suitable approach to assess the risk to the MP2 Project. However, very large sites or oddly shaped sites where the population may not be evenly distributed may not be suitable for assessment using the SRI approximation[16]. Therefore, the SRI has not been applied in this assessment.

4.2.2.3 Risk Integral

The risk integral (or enhanced expectation value) can be used when assessing major hazard installations and is defined as:

$$RI_{COMAH} = \sum_{N=1}^{N_{MAX}} f(N)N^a$$

Where:

f(N) is the frequency (*f*) of events leading to *N* fatalities

a is a constant that represents a scale aversion and is assigned a value of 1.4

The RI is calculated over the range of individual major accident scenarios that can give rise to N fatalities, and is assessed against criteria of 2,000 (broadly acceptable) and 500,000 (significant).

The approximate risk integral (ARI) can be determined based on the worst-case event, depending on whether the worst-case event is omni-directional (the same consequences in all directions) or uni-directional (the consequences vary by direction). For a single site, the worst-case scenario can be identified as the event that gives rise to the largest number of fatalities. However, as ten different COMAH establishments contribute to the overall risk within the Port, a single worst-case event at a

[16] *The Scaled Risk Integral – A Simple Numerical Representation of Case Societal Risk for Land Use Planning in the Vicinity of Major Accident Hazards*, Loss Prevention and Safety Promotion in the Process Industries, Volume II, 1995

[17] *A "Worst Case" Methodology for Risk Assessment of Major Accident Installation*, Process Safety Progress Vol. 19, No. 2, Summer 2000

particular site is not representative as it would not account for the contributions from all sites. Therefore, it is more appropriate to apply the RI_{COMAH} rather than the ARI_{COMAH}.

The HSA's guidance also describes the RI_{LUP}, which has a greater degree of scale aversion than the RI_{COMAH}, expressed as:

$$RI_{LUP} = \sum(F \times N) = \sum\left(f \times \frac{n + n^2}{2}\right)$$

However, both the HSA's guidance and the underlying research by Hirst & Carter (2000) only provide a single criterion against which to assess the RI_{LUP}, namely a value of 10,000 that corresponds to the broadly acceptable area. Therefore, for this assessment the RI metric has been used to estimate and assess the societal risk.

4.2.2.4 Expectation Value

In its *Guidance on 'Significant Modifications' Under the COMAH Regulations* (2019), the HSA describes the Expectation Value (EV) as one of the simpler measures of societal risk, noting that it is (broadly) the product of the individual level of risk (expressed in CPM) and the number of people affected. It is also sometimes referred to as the Potential Loss of Life (PLL). The HSA's guidance on significant modification sets an assessment criterion for the EV as:

> *The expectation value under the lower criterion line of the FN curve from N = 1 to N = 100 is approximately 450 and an increase of this order will trigger a requirement for a more detailed societal risk evaluation by the operator in the form of an FN curve: evaluation of that curve will determine whether the CCA will refer the modification to the planning authority.*
>
> *Modifications increasing the Expectation Value by 450 will require a more detailed assessment by the operator.*

However, the HSA's guidance also notes that the EV does not reflect aversion to large casualty events or the events affecting sensitive populations. For this assessment, the RI is considered to be a more appropriate metric to estimate and assess the societal risk, and the EV has not been used.

4.2.2.5 FN-Curve

In its guidance on societal risks and indices, the HSA notes that:

> *Whilst the SRI or ARI_{LUP} are used to provide a rapid initial assessment of the societal risk, it must be emphasized that a full consideration of the FN curve is probably a more robust approach.*

An FN curve shows the relationship between the frequency of an outcome and the cumulative severity of the outcome, typically plotted on a log-log scale to account for the range of values for both the frequency of occurrence and the severity of the outcome. It can take one of two forms[18]:

1. Non-cumulative frequency basis: for these graphs, called f-N curves (lower case 'f'), the value plotted on the y-axis is the discrete frequency of experiencing exactly N fatalities.

[18] *Guidelines for Developing Quantitative Safety Risk Criteria*, Centre for Chemical Process Safety, 2009

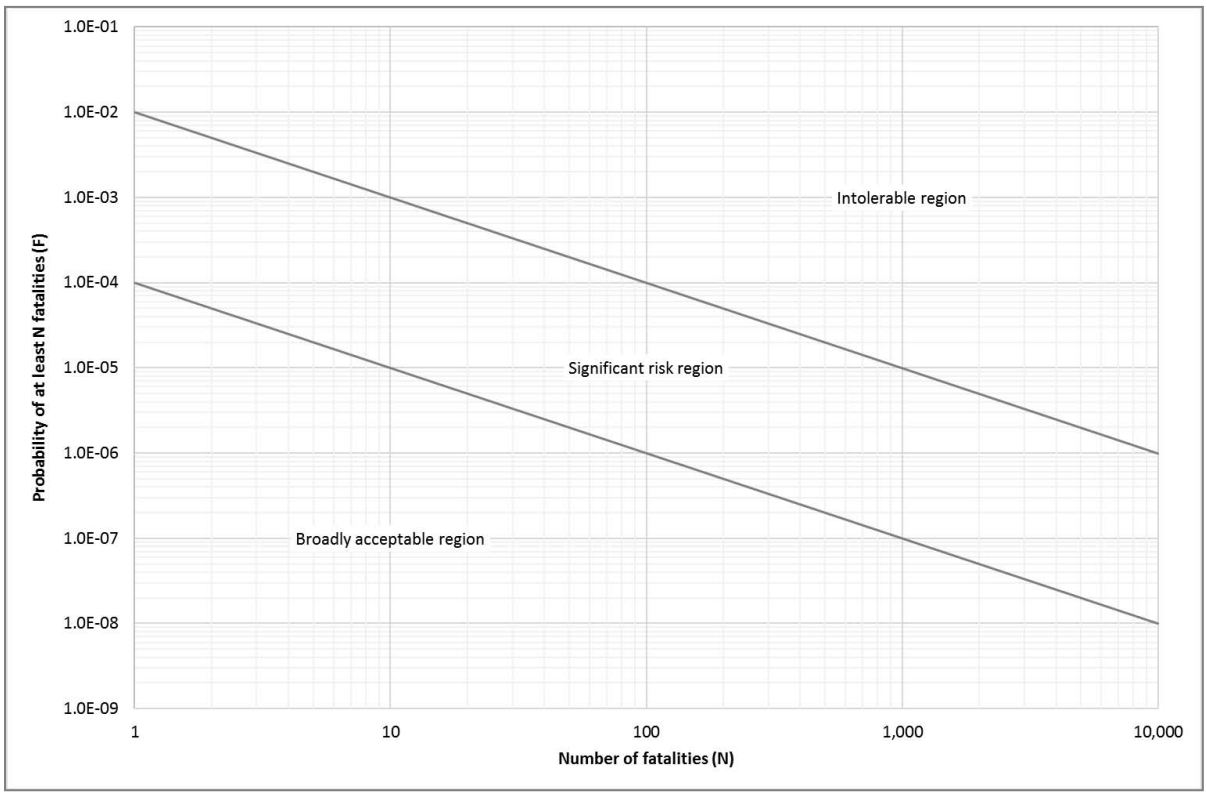
2. Cumulative frequency basis: for these graphs, called F-N curves (upper case 'F'), the value plotted on the y-axis is the cumulative frequency of experiencing N or more fatalities.

When assessing whether the level of societal risk may be regarded as tolerable, it is necessary to select appropriate criteria. In its guidance, the HSA identifies two criterion lines for FN (cumulative frequency) curves:

- an upper criterion of 1 in 5,000 for 50 fatalities
- a lower criterion line of 1 in 100,000 for 10 fatalities

Figure 4 shows the general format of an FN curve, with the number of (potential) fatalities, *N*, on the x-axis and the probability of at least *N* fatalities on the y-axis, *F*, together with the two criterion lines. The area above the upper criterion is considered to be the intolerable region and the area below the lower criterion line is considered to be the broadly acceptable region. The area between the two lines is generally considered to be the ALARP region, where the risk may be considered to be 'tolerable' provided that it is As Low As Reasonably Practicable (ALARP)[19].

Figure 4: Criterion Lines for FN Curves



There are other reference sources for the criteria that may be used to assess whether the level of societal risk is tolerable or not. In their review of societal risks and the use of FN curves and 'criterion lines' for the UK Health and Safety Executive (HSE), Ball and Floyd[20] note that:

[19] The UK HSE comments on the use of the terms so far as is reasonably practicable (SFAIRP) and as low as reasonably practicable (ALARP). It notes that SFAIRP is most often used in the context of workplace health and safety legislation and that ALARP is used by risk specialists. The HSE uses the term ALARP in its COMAH guidance and, in its view, considers that the two terms are (generally) interchangeable.

[20] *Societal Risks – a report prepared for the Health and Safety Executive*, 1998

> *Societal risk criteria should not, in other words, be viewed as more than broad indicators of a desirable objective, with many other, non-technical factors needing to be weighed in any final decision.*
>
> *…In short, the estimation of societal risks, in all their dimensions, is fraught with numerous uncertainties. For this reason, it is eminently sensible to regard societal risk criteria as no more than indicators.*
>
> *… the proposal here is that societal risk criteria should not be used in a 'prescriptive mode'.... given the degree of uncertainty associated with the determination of societal risks, it is widely accepted that societal risk criteria (in the form of FN lines) should be regarded as no more than indicators or guidelines.*

For this assessment, we have estimated the combined FN curve across the ten COMAH establishments and have assessed it against the two criterion lines identified in the HSA's guidance, which in turn are based on the guidance used by the UK HSE.

4.3 Scenarios

4.3.1 Overview

The HSA's land use planning guidance outlines the types of scenario to be considered as part of a COMAH land use planning assessment. The scenarios are based on the types of hazard at the respective installations and are intended to account for the worst-case scenario in each case. The COMAH establishments included in this assessment, and the COMAH substances that may give rise to major accident scenarios, are summarised in Table 9.

The HSA also provides guidance on the probability (frequency) of occurrence applicable to each of the accident scenarios, as set out in Table 10, which the HSA notes are estimated conservatively. For certain scenarios, the HSA identifies risk reduction measures that, if applicable to and applied at the particular establishment, yield reduced probabilities for the relevant scenario. For example, in the case of large-scale petroleum storage facilities that present a risk of a vapour cloud explosion (VCE), the HSA advises that the probability of occurrence can be reduced from the 'default' by an order of magnitude if the establishment has implemented the recommendations from the Buncefield Report[21]. The risk reduction measures in the Buncefield Report are applicable to the oil storage sites in the Port that store Class I petroleum (gasoline), and the HSA has advised that it is reasonable to apply the corresponding reduction in risk.

[21] *Safety and environmental standards for fuel storage sites*, Process Safety Leadership Group, Final Report, 2009

Table 9: COMAH establishments & substances

Establishment	Location	Tier	COMAH Substances
Calor Teoranta	Tolka Quay Road, Dublin 1	Upper	Class 0 (LPG) Class III
Fareplay Energy Ltd. (under the Topaz Energy Group)	Tankfarm 1, Alexandra Road, Dublin Port, Dublin 1 Tankfarm 2, Tolka Quay Road, Dublin Port, Dublin 1	Upper	Class I, II & III Class I, II & III
Indaver Ireland Ltd.	Tolka Quay Road, Dublin Port, Dublin	Upper	Flammables & toxics
Tedcastles Oil Products	Yard 1, Promenade Road, Parish of St. Thomas, Dublin Port, Dublin 1	Upper	Class I, II & III
Tedcastles Oil Products	Yard 2, Tolka Quay Road, Parish of St. Thomas, Dublin Port, Dubl:in 1	Upper	Class I & III
Valero Energy Ireland Ltd.	Alexandra Road, Dublin Port, Dublin 1	Upper	Class I, II & III
Electricity Supply Board	North Wall Generating Station, Alexandra Road, Dublin 1	Lower	Class III
Iarnród Éireann	Alexandra Road, North Wall, Dublin 1	Lower	Class III
Topaz Energy Limited	Terminal 1, Alexandra Road, Dublin Port, Dublin 1	Lower	Class I & II
Topaz Energy Limited	Yard 3, Alexandra Road, Dublin Port, Dublin 1	Lower	Class III

Table 10: Major Accident Scenarios from HSA Guidance

Installation type	Establishment	Scenario	HSA reference / default probability	Potential risk reduction measure	Probability used in assessment
LPG (HSA §3.1)	Calor	BLEVE	1×10^{-4} / year per site or 1×10^{-5} / year per vessel	Intumescent coating on vessels	1×10^{-6} / year per vessel
Large scale flammable storage (VCE risk) (Class I) (HSA §3.2)	Topaz 1 Valero (north) Fareplay 1 Fareplay 2 TOP 1 TOP 2 Topaz (see Table 2)	VCE	1×10^{-4} / year per site 1×10^{-5} / year per tank	Implementation of Buncefield recommendations	1×10^{-6} / year per tank
		Unbunded pool fire	1×10^{-4} / year per small installation 1×10^{-4} / 100π per metre / year	High flashpoint (e.g. kerosene) Reduction of overtopping	1×10^{-5} / 100π per metre / year
		Bund fire	1×10^{-3} / year per bund	High flashpoint (e.g. kerosene)	1×10^{-4} / year per bund
Large scale flammable storage (no VCE risk) (Class I with no VCE risk, or Class II) (HSA §3.3)	Topaz 1 Valero (north) Fareplay 1 Fareplay 2 TOP 1 TOP 2 Topaz (see Table 2)	Unbunded pool fire	1×10^{-4} / year per small installation 1×10^{-4} / 100π per metre / year	High flashpoint (e.g. kerosene) Reduction of overtopping	1×10^{-5} / 100π per metre / year
		Bund fire	1×10^{-3} / year per bund	High flashpoint (e.g. kerosene)	1×10^{-4} / year per bund
Storage of Class III(1) petroleum products (HSA §3.4)	ESB Iarnród Éireann Topaz Yard 3 Valero (south)	Unbunded pool fire not contained at the site (off-site fire)	1×10^{-5} / year per small installation 1×10^{-5} / 100π per metre / year	None	1×10^{-5} / 100π per metre / year

Installation type	Establishment	Scenario	HSA reference / default probability	Potential risk reduction measure	Probability used in assessment
Warehouses (HSA §3.6 & §3.7)	Indaver	Release from drum of toxic material	1×10^{-4} / year	None	1×10^{-4} / year
		Pool fire from drum of flammable material	1×10^{-4} / year	None	1×10^{-4} / year
		Bund fire	1×10^{-3} / year per bund	None	Not applicable – non-credible event
		Warehouse fire	1×10^{-4} / year	None	1×10^{-4} / year

4.3.2 LPG Releases

The worst-case event for an LPG site is a BLEVE of a storage tank, with a frequency of 1×10^{-5} per vessel per year as per the HSA's guidance. To reflect the different sizes of tanks at the Calor establishment, we have accounted for BLEVE of the four larger semi-mounded tanks to the north west of the site and the 15 aboveground tanks to the centre / east of the site separately. As the aboveground tanks and the exposed end caps of the semi-mounded tanks are protected by means of a fire-proof insulation, we have applied the lower likelihood of 1×10^{-6} per vessel per year.

4.3.3 Bund Fires

A bund fire may arise following the release of petroleum product from a tank (the primary containment). The probability of fire in a bund storing Class I material is 1×10^{-3} per year, and for a bund storing Class II material is an order of magnitude less (1×10^{-4} per year). The high flash point of Class III products means that there is effectively no risk of ignition following a spill where it is confined within the bund area.

For bunds that contain more than one class of petroleum product (e.g. Class I and Class II), the assessment is based on the higher (more volatile) class of product. Therefore, for a bund containing both Class I and Class III tanks, the scenario has been modelled as a Class I fire.

The storage tanks in the solvent blending area of the Indaver establishment are double skinned tanks and therefore catastrophic failure of a tank resulting in a bund fire has been discounted as a credible scenario.

4.3.4 Unbunded Fire

In the event of a catastrophic failure of a storage tank in which the full contents of the tank are released, the material may have sufficient momentum to 'overtop' the bund wall resulting in an uncontained pool of material. The extent to which the pool may spread depends on multiple factors, including the volume of material released, the momentum of the material, the type of material, and the nature and topography of the surrounding area. As it is not practicable or reasonable to estimate the probability of each potential pool size for each tank, we have adopted the HSA's guidance and have estimated the size of an unconfined pool as:

$$R = 6.85 \times V^{0.44537}$$

In this formula, *R* is the radius of the pool (in metres) and *V* is the volume of material (in cubic metres). As per the HSA's guidance, the size of an unconfined pool is subject to a maximum diameter of 100 m (a radius of 50 m).

The HSA's guidance describes the approach for assessing the risk from unbunded fires in the context of a single bund, rather than for a site with multiple bunds, or, as in the case of the Port, multiple sites with multiple bunds. Therefore, there are two possible approaches to calculating the frequency of an unbunded fire across the Port:

1. To calculate the frequency of an unbunded fire for each of the individual bunds at each of the sites, using the perimeter of the bund as the input to the frequency:

$$f = \frac{1 \times 10^{-4}}{100\pi} \times bund\ perimeter$$

2. To calculate the frequency of an unbunded fire for each of the individual sites, using the nominal perimeter of the combined bunded area of the site as the perimeter

$$f = \frac{1 \times 10^{-4}}{100\pi} \times nominal\ perimeter\ of\ total\ bunded\ area$$

We have assessed the results under both approaches and there is little difference in the overall calculated risk. This assessment is based on the second approach, which we consider is more consistent with the HSA's guidance, and based on the configuration of the sites within the Port it is the more conservative of the two.

In applying the second approach, we have taken the direction of release following failure of a tank to be to the north, east, south or west, with an equal probability for each direction (25%). To reflect the configuration of the bunds within the port and the proximity of the oil storage sites to one another, we have also assumed that if product from one site (or bund) overtops towards another site (or bund), the material will be contained within the second site (or bund) and will not migrate further. In such cases, the size of the pool is taken to be that of the second bund.

For Class III product, the high flash point means that where a spill does not migrate beyond the boundary of the COMAH establishment or beyond another COMAH establishment, then there is effectively no risk of ignition. If the Class III material does migrate beyond the site boundary into an area in which there are no controls on ignition sources (e.g. onto a road), we conservatively assume that the unbunded material ignites.

The storage tanks in the solvent blending area of the Indaver establishment are double skinned tanks and therefore catastrophic failure of a tank resulting in overtopping of the bund wall has been discounted as a credible scenario.

4.3.5 Vapour Cloud Explosion

A vapour cloud explosion (VCE) is a credible scenario at an installation that stores bulk flammable liquids that meets the following criteria:

- used for the storage of Class I petroleum (petrol)
- in vertical, cylindrical, non-refrigerated, above-ground storage tanks
- with side walls greater than 5 m in height
- at filling rates greater than 100 m3 per hour

The HSA's guidance advises that the probability of a VCE occurring at such an establishment can conservatively be taken as 1×10^{-4} per site per annum, or as 1×10^{-5} per tank per annum. However, this can be adjusted to take account of protection systems and other controls that may be in place. If a site has implemented all the recommendations arising from the Buncefield investigation, the likelihood of a VCE arising can be reduced by an order of magnitude to 1×10^{-5} per establishment per annum, or to 1×10^{-6} per tank per annum.

In light of the number of Class I storage tanks within the Port, we have applied the probability of 1×10^{-6} per tank per annum and we have assumed that the measures in place at the bulk storage installations storing Class I petroleum in the Port satisfy the Buncefield recommendations.

4.3.6 Warehouse Fire

The probability of a warehouse fire is dependent on a variety of factors, including the nature of the materials stored (whether they are flammable), the volume of materials stored and the size of individual containers and storage areas, and the systems in place to protect against a fire. For this assessment, we have conservatively assumed the probability of a fire within the flammable drum store at the Indaver establishment to be 1×10^{-4} per annum, as per the HSA's guidance for a major fire involving 100% of the inventory of a flammable goods warehouse.

4.3.7 Toxic Releases

The Indaver establishment handles a variety of hazardous wastes, with materials classified as toxic typically handled in 200 litre drums. The probability of a release of a toxic material is based on several factors, including the number of drums / containers and the number of drum movements. For this assessment, we have conservatively assumed that the probability of a release of the full contents of a drum is 2×10^{-6} per drum per annum.

In addition, the probability of exposure to the released material is dependent on the weather conditions at the time of the release. For this assessment, the evaporation and dispersion of a pool of dilute hydrofluoric acid (the representative worst-case toxic substance at the establishment) was modelled under the following weather conditions:

- Typical conditions (D5): a wind speed of 5 m/s and a Pasquill stability class[22] of D.
- Calm conditions (F2): a wind speed of 2 m/s and a Pasquill stability class of F.

The frequency of these conditions occurring at Dublin Airport (the closest meteorological station) is approximately 80% of the time for class D stability conditions, and approximately 20% of the time for class F stability conditions.

4.4 Consequence Assessment

4.4.1 Risk of Fatality

The risk of fatality arising from a major accident hazard can be related to the consequences of the event (e.g. exposure to thermal radiation, a blast overpressure, or a toxic substance) by means of probit functions and other derived relations.

As described in the UK HSE's *Methods of approximation and determination of human vulnerability for offshore major accident hazard assessment*, probits account for the variation in tolerance to harm for an exposed population, with the fatality rate of personnel exposed to harmful agents over a given period of time calculated using a probit function of the general form:

$$Y = k_1 + k_2 \ln(V)$$

where:

- *Y* is the probit, a measure of the percentage of the vulnerable resource that might sustain damage (the probability of fatality).

[22] A measure of the stability / instability of the atmosphere, ranging from A (extremely unstable) to G (extremely stable).

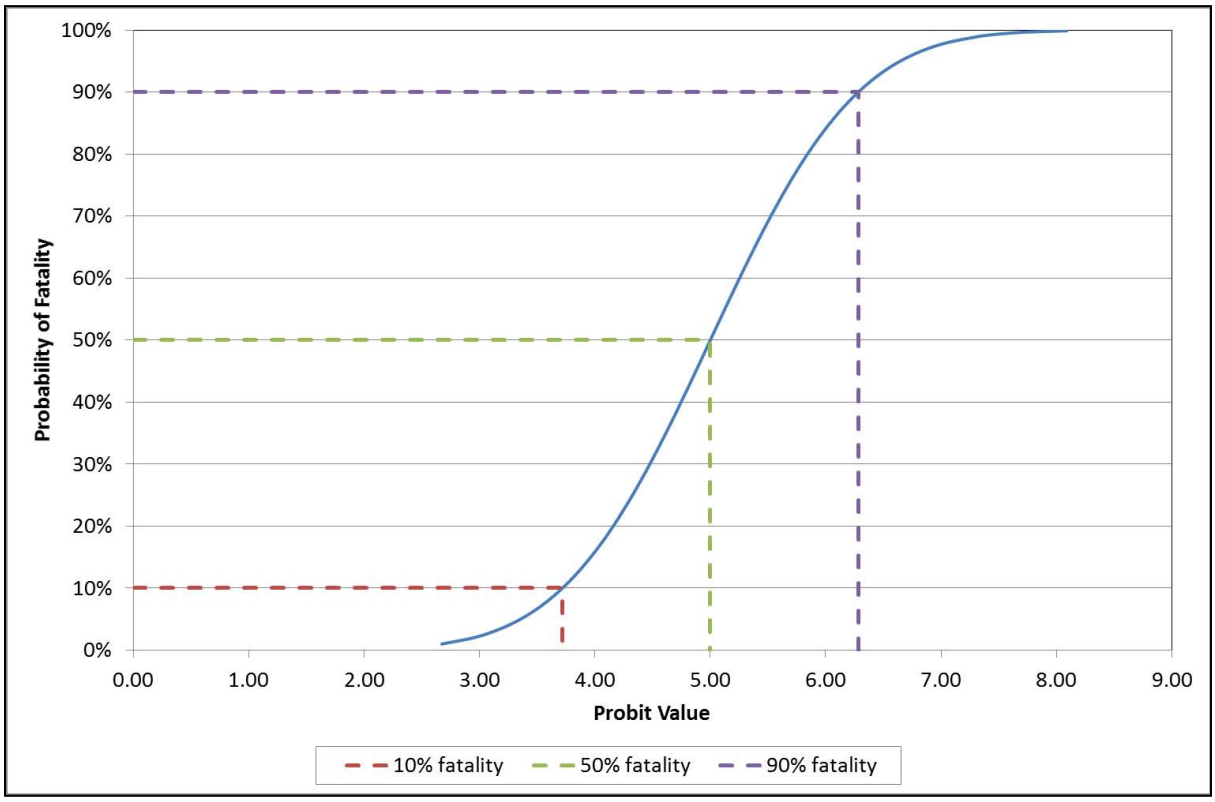
- *k1* & *k2* are constants depending upon the type of harm that the population is exposed to (thermal, pressure, toxic effects).
- *V* is the product of intensity (*I*) or concentration (*C*) of the received hazardous agent to an exponent n and the duration of exposure in seconds or minutes (*t*). In other words, $V = C^n \cdot t$.

The probit function can be used to calculate the risk to people exposed to the hazardous agent (thermal radiation, overpressure or concentration of toxic substance), expressed as a probability of lethal impacts, as follows:

$$Probability = \frac{1}{\sqrt{2\pi}} \int_{u=-\infty}^{u=Y-5} exp\left(-\frac{u^2}{2}\right) du$$

The relationship between the probability of fatality and the probit value is shown in Figure 5. This shows that, for example, a probit value of 5 corresponds to a probability of fatality of 50%. Similarly, probit values of 3.72 and 6.28 correspond to probabilities of fatality of 10% and 90%, respectively.

Figure 5: Probit Value versus Probability of Fatality



4.4.2 Thermal Effects

The probit function for thermal effects is:

$$Y = -14.9 + 2.56 \cdot \ln\left(I^{4/3} \cdot t\right)$$

In this equation, *I* is the thermal flux expressed in kilowatts per square metre (kW/m^2) and the time *t* is expressed in seconds. For short duration fire events, such as a fireball from a BLEVE at an LPG facility, the time during which people may be exposed to the thermal radiation is set at the duration

of the event. For longer duration events, such as bund and pool fires, the duration is typically set at 75 seconds to take account of the time required for people to escape from the area.

In accordance with the HSA's (and other) guidance, the bunded and unbunded fires have been modelled using the following surface emissive powers.

- Class I: 52 kW/m^2
- Class II and III: 25 kW/m^2
- Solvent: 40% of the combustion heat is radiated

For people located indoors, the HSA advises that the building may provide some protection from the fire and that this should be taken into account.

- For exposure to fluxes in excess of 25.6 kW/m^2 the building is conservatively assumed to catch fire quickly and a 100% fatality risk is applied.
- For exposure to fluxes less than 12.7 kW/m^2 the people inside the building are assumed to be protected and a 0% fatality risk is applied.
- For exposure to fluxes in between these two values, people are assumed to escape outdoors and, therefore, have a risk of fatality corresponding to that outdoors.

We have estimated the proportion of people that may be indoors and outdoors based on the particular receptor, which range from 100% indoors for certain offices and other workplaces, to 100% outdoors for the majority of outdoor occupied places within the Port. For residential areas, we have assumed that, on average, people are indoors for 90% of the time and outdoors for 10% of the time.

For vessels berthed in the Port, we have assumed a 50:50 split for people indoors and outdoors, and for vehicles travelling through the Port we have conservatively assumed that the occupants would be subject to similar thermal effects to people outdoors. We have also conservatively assumed that vehicle occupants could be exposed to the corresponding thermal fluxes for 75 seconds.

4.4.3 Overpressure Effects

Unlike the probit for thermal effects, the probit for overpressure effects is only related to the overpressure (*P*); the probit function (with pressure expressed in pounds per square inch – psi) is:

$$Y = 1.47 + 1.35 \cdot \ln(P)$$

For the VCE events at the Class I product storage tanks, the relationship between the overpressure arising from the event and the distance from the source are based on the UK HSE's *Review of significance of societal risk for proposed revision to land use planning arrangements for large scale petroleum storage sites* (RR512, 2007), shown in Table 11.

Table 11: Distance versus Overpressure for 'Buncefield' Type Events

Distance (m)	Overpressure (mbar)
Up to 50 (near field)	1,000
97	600
264	140
447	70
2,000	13

4.4.4 Toxic Effects

The probit function for toxic effects takes the general form:

$$Y = k_1 + k_2 \ln(C^n \times t)$$

The constants *k1*, *k2* and the exponent *n* are dependent on the particular toxic substance. For dilute hydrofluoric acid (the representative worst-case scenario for the Indaver establishment), the probit takes the form:

$$Y = -8.4 + 1 \times \ln(C^{1.5} \cdot t)$$

In this case, the time *t* is expressed in minutes and, as per the HSA's guidance, is set at 30 minutes.

5 Development Sensitivity Levels

5.1 Introduction

The HSA provides advice to the planning authorities, in accordance with the COMAH Regulations, using a similar system to that applied by the UK HSE, which is described in the HSE's *Land Use Planning Methodology*. Different types of development are categorised under one of four sensitivity levels:

- Level 1: people at work, parking (workplaces and parking areas)
- Level 2: developments for use by the general public (housing, hotel / hostel / holiday accommodation, transport links, indoor use by the public, outdoor use by the public)
- Level 3: developments for use by vulnerable people (institutional accommodation and education, prisons)
- Level 4: very large and sensitive developments (institutional accommodation, very large outdoor use by the public)

Table 12 provides a summary of the sensitivity levels and examples of the types of development for each.

Table 12: Summary of development types for Land Use Planning Zones

Zone	Type	Description / Examples
Inner	Workplaces Parking area Estate & access roads Members of the public not normally present, or present in small numbers & for a short time	Workplaces (non-retail) for less than 100 occupants in any building and less than **three** occupied storeys Parking facilities (car park, truck park) with no other associated facilities (other than toilets) Single carriageway roads Developments for **indoor** use by the public where total floor space is **less than 250 m²** (e.g. restaurants and cafés, shops, petrol filling stations, coach / bus stations, ferry terminals)
Middle	Large workplaces Transport links Indoor & outdoor areas for use by the general public	Workplaces providing for more than **100** occupants in any building, or **three** or more occupied storeys in height Major transport links (e.g. motorway, dual carriageway) Developments for **indoor** use by the public where total floor space is **between 250 and 5,000 m²** (e.g. restaurants and cafés, shops, petrol filling stations, coach / bus stations, ferry terminals) Developments for **outdoor** use by the public with less than **100** people at any one time
Outer	Developments for use by vulnerable people Large developments for use by the general public	Developments for **indoor** use by the public where total floor space is **greater than 5,000 m²** (e.g. restaurants and cafés, shops, petrol filling stations, coach / bus stations, ferry terminals) Developments for **outdoor** use by the public with **100 to 1,000** people at any one time
Outside all zones	Very large and sensitive developments Very large developments for use by the general public	Developments for **outdoor** use by the public **more than 1,000** people at any one time Large outdoor public use e.g. theme parks, open air markets, sports stadia, festivals

The HSA provides its advice to planning authorities in the form 'advises against' or 'does not advise against' depending on which zone (from Table 8) the development lies within, as shown in Table 13 (a tick indicating 'do not advise against' and a cross indicating 'advise against').

Table 13: HSA Matrix for Land Use Planning Advice

Sensitivity Level	Individual Risk Zone (refer to Table 3)		
	Inner Zone	Middle Zone	Outer Zone
Level 1	✓	✓	✓
Level 2	×	✓	✓
Level 3	×	×	✓
Level 4	×	×	×

The development sensitivity levels applicable or analogous to the types of development associated with the MP2 Project are summarised in Table 14 (from the HSA's and UK HSE's guidance). The sensitivity levels relevant to the MP2 Project are described in more detail in Sections 5.2, 5.3 and 5.4 based on the HSA's and the HSE's guidance and, in the absence of a direct comparison between the activities in the MP2 Project area and examples of a development type from the HSA's guidance, the principles (justification) outlined in the guidance.

Table 14: Development Sensitivity Levels applicable or analogous to MP2 Project

Development Type	Examples	Development Detail & Size	Justification
DT1.1 – workplaces	Offices, factories, warehouses, haulage depots, farm buildings, non-retail markets, builder's yards.	Workplaces (predominantly nonretail), providing for less than 100 occupants in each building and less than 3 occupied storeys – Level 1	Places where the occupants will be fit and healthy, and could be organised easily for emergency action. Members of the public will not be present or will be present in very small numbers and for a short time.
	Exclusions		
	-	DT1.1 ×1 Workplaces (predominantly non-retail) providing for 100 or more occupants in any building or 3 or more occupied storeys in height – Level 2 (except where the development is at the major hazard site itself, where it remains Level 1).	Substantial increase in numbers at risk with no direct benefit from exposure to the risk.
	Sheltered workshops, Remploy.	DT1.1 ×2 Workplaces (predominantly non-retail) specifically for people with disabilities – Level 3	Those at risk may be especially vulnerable to injury from hazardous events and / or they may not be able to be organised easily for emergency action
DT1.2 – parking areas	Car parks, truck parks, lock-up garages	Parking areas with no other associated facilities (other than toilets) – Level 1	-
	Exclusions		
	Car parks with picnic areas, or at a retail or leisure development, or serving a park and ride exchange.	DT1.2 ×1 Where parking areas are associated with other facilities and developments the sensitivity level and the decision will be based on the facility or development.	-

Development Type	Examples	Development Detail & Size	Justification
DT2.1 – housing	Houses, flats, retirement flats/ bungalows, residential caravans, mobile homes.	Developments up to and including 30 dwelling units and at a density of no more than 40 per hectare – Level 2	Development where people live or are temporarily resident. It may be difficult to organise people in the event of an emergency.
	Exclusions		
	Infill, backland development	DT2.1 ×1 Developments of 1 or 2 dwelling units – Level 1	Minimal increase in numbers at risk.
DT2.2 – hotel / hostel / holiday accommodation	Hotels, motels, guest houses, hostels, youth hostels, holiday camps, holiday homes, halls of residence, dormitories, accommodation centres, holiday caravan sites, camping sites.	Accommodation up to 100 beds or 33 caravan / tent pitches – Level 2	Development where people are temporarily resident. It may be difficult to organise people in the event of an emergency.
	Exclusions		
	Smaller - guest houses, hostels, youth hostels, holiday homes, halls of residence, dormitories, holiday caravan sites, camping sites.	DT2.2 ×1 Accommodation of less than 10 beds or 3 caravan / tent pitches – Level 1	Minimal increase in numbers at risk.
DT2.3 – transport links	Motorway, dual carriageway.	Major transport links in their own right; i.e. not as an integral part of other developments – Level 2	Prime purpose is as a transport link. Potentially large numbers exposed to risk, but exposure of an individual is only for a short period.
	Exclusions		
	Estate roads, access roads.	DT2.3 ×1 Single carriageway roads – Level 1	Minimal numbers present and mostly a small period of time exposed to risk Associated with other development

Development Type	Examples	Development Detail & Size	Justification
DT2.4 – indoor use by public	Food & drink: drive-through fast food. Retail: petrol filling station (total floor space based on shop area not forecourt), Assembly & leisure: coach / bus / railway stations, ferry terminals, airports.	Developments for use by the general public where total floor space is from 250 m^2 up to 5,000 m^2 – Level 2	Developments where members of the public will be present (but not resident) Emergency action may be difficult to co-ordinate.
	Exclusions		
	-	DT2.4 ×1 Development with less than 250 m^2 total floor space (of all floors) – Level 1	Minimal increase in numbers at risk
DT2.5 – outdoor use by public	Assembly & leisure: coach / bus / railway stations, park & ride interchange, ferry terminals.	Principally an outdoor development for use by the general public i.e. developments where people will predominantly be outdoors and not more than 100 people will gather at the facility at any one time – Level 2	Developments where members of the public will be present (but not resident) either indoors or outdoors. Emergency action may be difficult to co-ordinate.
	Exclusions		
	Outdoor markets, car boot sales, funfairs. Picnic area, park & ride interchange, viewing stands, marquees.	DT2.5 ×1 Predominantly open-air developments likely to attract the general public in numbers greater than 100 people but up to 1,000 at any one time – Level 3	Substantial increase in numbers at risk and more vulnerable due to being outside

5.2 Check-in Booths & Stacking

5.2.1 Car Passengers

Car passengers are members of the public and may include vulnerable people (the young, elderly and / or infirm), and they may not be easy to organise in the event of an emergency. Individual car passengers may only be present at the check-in booths for a relatively short time during the check-in process (typically less than 1 minute). However, a queue may start to form 15 minutes before the check-in booths open and therefore a queue of traffic of up to 580 m may form before the booths open. Based on the indicated 6 no. lanes for light vehicle check-in, the queue may extend approximately 100 m west from the check-in booths.

In the event of three ships departing at the same time, and assuming a conservative 45 second check-in time, the longest queue of passenger vehicles may be up to 680 m, extending approximately 115 m west from the check-in booths. Based on an average car length of 6 m (including the gap to other vehicles) and up to 4 passengers per car, there could be in the order of 450 people in the queue leading to the check-in booth. Based on the HSA's COMAH land use planning guidance, we consider that the check-in booths and the associated vehicle queue falls within Sensitivity Level 3:

- The check-in booths and queues constitute outdoor use by the public.
- There is likely to be more than 100 people, but less than 1,000 people present in the queue.
- The queue may include vulnerable members of the public.
- Members of the public may be more difficult to organise in the event of an emergency.

The light vehicle check-in booths are within the outer zone, which is consistent with the HSA's guidance. The majority of the length of the associated queue lies within the outer zone, with the potential for a small proportion to lie within the middle zone. Under the land use planning guidance, a small proportion of the queue (up to approximately 10% of the queue length) may extend into the middle zone.

5.2.2 Coaches

Coach traffic will check-in at the same booths as passenger cars. As coaches also contain members of the public and at a higher passenger density, we consider that the check-in booths and associated queues fall within Sensitivity Level 3, provided that the total number of people that may be present in the queue is limited to 1,000.

5.2.3 Professional Drivers

5.2.3.1 Shunter Drivers

In our opinion, shunter drivers may be classified as workers in the context of the COMAH land use planning guidance. The examples of workplaces provided in the HSA's (and HSE's) guidance include offices, factories, warehouses and haulage depots and are therefore not confined to COMAH workplaces. The areas in which trailers are parked and manoeuvred are analogous to warehouses and haulage depots (workplaces) or to truck parks (parking areas), both of which fall within Sensitivity Level 1 provided that there are no more than 100 occupants (workers) present. Therefore, areas in which shunter drivers operate may be located within the inner zone.

5.2.3.2 Dangerous Goods Vehicle Drivers

Drivers of heavy goods vehicle (HGV) and light goods vehicle (LGV) that transport dangerous goods are subject to the E*uropean Agreement Concerning the International Carriage of Dangerous Goods by Road* (ADR). As set out in the HSA's guidance on ADR:

> *The ADR and current regulations on the carriage of dangerous goods by road require drivers of vehicles used for the carriage of dangerous goods by road to be trained to enable them to understand and be aware of hazards arising in the carriage of dangerous goods. The training must give drivers basic information indispensable for minimising the likelihood of an incident taking place and, in such an event, to enable them to take measures that may prove necessary for their own safety and that of the public and the environment, to limit the effects of such an incident.*

There is no explicit guidance on whether trained drivers should be classified as members of the public or as workers[23], or whether the areas in which such drivers operate should be classified as workplaces under the COMAH land use planning guidance. It is therefore necessary to consider the principles (justification) set out by the HSA for the different sensitivity levels.

In general, Sensitivity Level 1 developments (which can be accommodated within the inner zone) are places where occupants will be fit & healthy and could be organised easily for emergency action. Workplaces fall within Sensitivity Level 1, as well as places where (very) small numbers of members of the public may be present for a short time.

In this context, we consider that it is reasonable to classify drivers of dangerous goods vehicles as workers and the areas in which they operate as workplaces, and therefore the check-in booths and associated queues for this class of driver fall within Sensitivity Level 1, subject to a maximum of 100 drivers (occupants).

- Drivers of dangerous goods vehicles are exposed to hazards similar to those present within the Port, and at COMAH establishments in general, and therefore they may be expected to have a greater awareness of the hazards within the Port and a greater capacity to respond in an emergency.
- Drivers of dangerous goods vehicles are workers, and by virtue of using the Port, the Port forms part of their workplace.
- Drivers of dangerous goods vehicles are required to undergo specialised training on ADR, in addition to their training as professional drivers.
- Truck parks are classified as Sensitivity Level 1.

During peak times, there could be a queue of up to 1,680 m of goods vehicles at the check-in booths. Based on an average length of 16 m (including the space between vehicles) and a single driver per vehicle, there could be in the order of 100 drivers (occupants) present in the queue. This type of development could be accommodated within the inner zone.

5.2.3.3 Other Drivers

Drivers of goods vehicles that do not convey dangerous goods are not required to undergo specialised ADR training and therefore may not be as familiar with hazardous substances and the associated risks. However, while this class of drivers may not have undergone ADR training,

[23] HGV, LGV and other professional drivers may be classified as workers based on their occupation / employment status.

professional drivers operating within the EU are subject to the *EU Directive on the initial qualification and periodic training of drivers of certain road vehicles for the carriage of goods or passengers* (2003/59/EC) and the corresponding national legislation. The Directive applies to drivers under licence categories C and D (LGV, HGV and passenger vehicles) and requires that drivers undergo specialised training:

- **to ensure passenger comfort and safety**: road sharing, using specific infrastructures (public areas, dedicated lanes), managing conflicts between safe driving and other roles as a driver, interacting with passengers, peculiarities of certain groups of passengers (disabled persons, children)
- **to know the regulations governing the carriage of goods**: transport operating licences, international transport permits, crossing borders
- **to know the regulations governing the carriage of passengers**: carriage of specific groups of passengers, safety equipment on board buses
- **to make drivers aware of the risks of the road and of accidents at work**: types of accidents at work in the transport sector, involvement of lorries / coaches, human, material and financial consequences.
- **to assess emergency situations**: behaviour in an emergency situation, assessment of the situation, avoiding complications of an accident, summoning assistance, assisting casualties and giving first aid, reaction in the event of fire, evacuation of occupants of a lorry / bus passengers, ensuring the safety of all passengers

While this training may not be specifically aimed at the hazards associated with COMAH establishments, it requires that professional drivers have a greater level of training than members of the public.

As in the case of drivers of dangerous goods vehicles, we consider that it is reasonable to consider that professional drivers of goods vehicles are workers and that the areas in which they operate are workplaces. Therefore, we consider that it is reasonable to classify the check-in booths for all professional drivers and the associated queues as Sensitivity Level 1, subject to a maximum of 100 drivers (occupants):

- All professional drivers are required to undergo specialised training, including training for emergency situations.
- Professional drivers are workers, and by virtue of using the Port, the Port forms part of their work place.
- Truck parks are classified as Sensitivity Level 1.

During peak times, there could be a queue of up to 1,680 m of goods vehicles at the check-in booths. Based on an average length of 16 m (including the space between vehicles) and a single driver per vehicle, there could be in the order of 100 drivers (occupants) present in the queue. This type of development could be accommodated within the inner zone.

5.3 State Services

5.3.1 Offices

Offices and indoor workplaces for the state services (customs, immigration, policing, government departments) for up to 100 people and for a building no more than two storeys fall within Sensitivity Level 1 and may be located within the inner zone. Larger workplaces (for more than 100 people, or more than 2 storeys) fall within Sensitivity Level 2 and could be accommodated in the middle zone.

5.3.2 Inspection Areas

There is no explicit guidance on the relevant sensitivity level for areas in which state services workers carry out inspections and checks on passengers and vehicles, and therefore it is necessary to consider the HSA's principles (justifications) for the different sensitivity levels.

In our opinion, it is reasonable to consider short duration inspections / checks, during which passengers remain within their vehicle, or exit the vehicle to open doors / car boots to allow a brief visual inspection, as meeting the general description for a Sensitivity Level 1 development, with members of public present in very small numbers for a (very) short time (DT1.1).

Areas in which more detailed inspections / checks are carried out, during which the occupants may be required to remain outside the vehicle for a longer period (30 to 60 minutes), may also meet the general requirements for Sensitivity Level 1 developments, based on the following:

- Only small numbers of people will be present at any one time (see justification for DT1.1 in Table 14)
- While the inspection may be longer than the initial 'screening' check / visual inspection, on average the inspections will be of a relatively short duration (see justification for DT1.1, DT2.3 and DT2.4 ×1 in Table 14).
- Members of the public at the inspection area will be accompanied at all times by members of State Services staff and therefore any emergency action that may be required could be organised relatively easily (see justification for DT1.1, DT2.3 and DT2.4 ×1 in Table 14).
- Several developments for members of the public are explicitly classified as Sensitivity Level 1 areas, including:
    - Car parks (with no other facilities) (DT1.2 ×1 in Table 14)
    - Developments of 1 or 2 dwellings (which could contain up to 10 people) (DT2.1 ×1 in Table 14)
    - Accommodation of less than 10 beds or 3 caravan / tent pitches (DT2.2 ×1 in Table 14)
    - Indoor areas up to 250 m^2 for use by the public (DT2.4 ×1 in Table 14)

While none of these examples are directly analogous to an inspection area, they demonstrate that small numbers of members of the public can be accommodated within the inner zone.

5.4 Other Areas

5.4.1 Staff Car Park

Staff car parks fall within Sensitivity Level 1 as they are parking areas associated with a workplace (DT1.1)

5.4.2 Cabins / Offices

Other cabins / offices and similar indoor workplaces for up to 100 people and for a building no more than 2 storeys fall within Sensitivity Level 1.

5.5 Summary

In our opinion, the check-in booths, queuing areas and state services area may be classified as shown in Table 15. However, the sensitivity levels for the different parts of the development will ultimately be subject to agreement with the HSA.

Table 15: Summary of Development Sensitivity Levels

Area	Sensitivity Level	Land Use Planning Zone	Notes
Passenger car check-in booths & queues	3	Outer	Approximately to 10% of the queue may straddle the middle zone (Sensitivity Level 2)
Coach check-in booths & queues	3	Outer	Approximately 10% of the queue may straddle the middle zone (Sensitivity Level 2)
Shunter drivers	1	Inner	Subject to a maximum of 100 occupants within the inner zone
HGV check-in booths & queues	1	Inner	Subject to a maximum of 100 occupants within the inner zone
State services – offices / indoor workplaces	1	Inner	Subject to a maximum of 100 occupants and no more than 2 storeys
State services – short duration inspection / visual check	1	Inner	Limited to a short duration inspection in which the occupants remain in the vehicle or exit the vehicle to facilitate a brief visual inspection by State Services.
State services – detailed vehicle inspection	1 (2)	Inner (Middle)	Subject to agreement with the HSA. Otherwise likely to fall within Sensitivity Level 2 (middle zone)

6 RISK ASSESSMENT RESULTS

6.1 Individual Risk

The aggregated risk contours for the inner, middle and outer zones around the COMAH establishments are shown in Appendix 4. The risk contours show that the inner zone (the red contour) extends over the COMAH establishments and adjacent areas along Tolka Quay Road and Alexandra Road, and includes part of the area of the MP2 Project. It also shows that parts of the current road network are located in the inner (red contour), middle (yellow contour) and outer (green contour) zones.

The Sensitivity Level 1 areas associated with the MP2 Project (as described in Section 5) lie within the inner, middle and outer zones and, as per the HSA's guidance (refer to Section 4.2.1), they satisfy the individual risk criteria.

The Sensitivity Level 2 areas associated with the MP2 Project – namely parts of the reconfigured road layout and traffic lanes to and from the ferry terminals – also lie within the inner, middle and outer zones. Although the HSA's guidance indicates that Sensitivity Level 2 developments should be advised against if they lie within the inner zone, it is important to recognise that these elements of the development are not new to the Port; rather, they are parts of the existing Port infrastructure that are being relocated as part of the development. In this context, we consider that the Sensitivity Level 2 areas are consistent with the HSA's guidance, taking into account the assessment of the societal risk (described in Section 6.2).

The Sensitivity Level 3 areas associated with the MP2 Project – namely the passenger and coach check-in areas – lie within the outer zone and therefore satisfy the HSA's individual risk criteria. During peak times, parts of the traffic queue that may accumulate at the check-in booths could enter the middle zone (to the east along Alexandra Road Extension). However, the HSE's guidance on development sensitivity levels, from which the HSA has developed its guidance, permits small parts of developments to straddle zones, as follows:

> *Development Types that 'straddle' zone boundaries will normally be considered as being in the innermost zone to the major hazard unless either of the two following conditions applies. The Development Type will be considered to be in the OUTERMOST of the zones if:*
>
> - *less than 10% of the area marked on the application for that particular development type is inside that boundary, or*
> - *it is only car parking, landscaping (including gardens of housing), parks and open spaces, golf greens and fairways or access roads etc. associated with the development; that are in the inner of the zones*

In the case of traffic queueing at the passenger vehicle check-in booths, we estimate that approximately 10% of the queue could lie within the middle zone during normal peak activities, falling within the first of the two criteria for a development that straddles two zones.

Overall, it is considered that the constituent parts of the MP2 Project and their locations relative to the individual risk contours satisfy the HSA's individual risk criteria under its land use planning guidance.

6.2 Societal Risk

6.2.1 Overview

In this section we examine the societal risk within the Port associated with the MP2 Project. As described in Section 6.1, the MP2 Project will result in the relocation of existing activities and traffic routes from other areas of the Port currently serving Terminals 1, 2 and 5; the development is not introducing new activities. Therefore, to assess the societal risk, it is reasonable to examine the difference in societal risk between the current Port configuration and the configuration following the MP2 Project.

6.2.2 Risk Integrals

6.2.2.1 Current Port Layout

There are 1,545 individual events that contribute to the risk across the Port from the individual COMAH establishments, taking into account:

- the generic types of events relevant to each site (e.g. bund fire, VCE, BLEVE)
- the different directions in which certain events may arise (e.g. unbunded pool fires, which may arise from overtopping a bund in one of four directions)
- the time of day and week when the event may occur and therefore the population (number of people) that may be exposed at that time

For each individual event there is a probability of occurrence (*f*) and the number of potential fatalities (*N*) (based on the application of the probit function). This data allows the risk integral to be calculated:

$$RI_{COMAH} = \sum_{N=1}^{N_{MAX}} f(N)N^a$$

As per the HSA's guidance, the value of a (the degree of risk aversion) is set as 1.4, which yields a conservative estimate for the RI of 101,708 for the current layout. This lies above the lower comparison value of 2,000, below which the risk is considered to be broadly acceptable, and substantially below the upper comparison value of 500,000, above which the risk is considered to be significant.

6.2.2.2 Post-MP2 Project Port Layout

The RI for the post-MP2 Project is conservatively estimated at 99,062, which is a reduction from the current layout. It also lies between the two criteria of 2,000 (broadly acceptable) and 500,000 (significant).

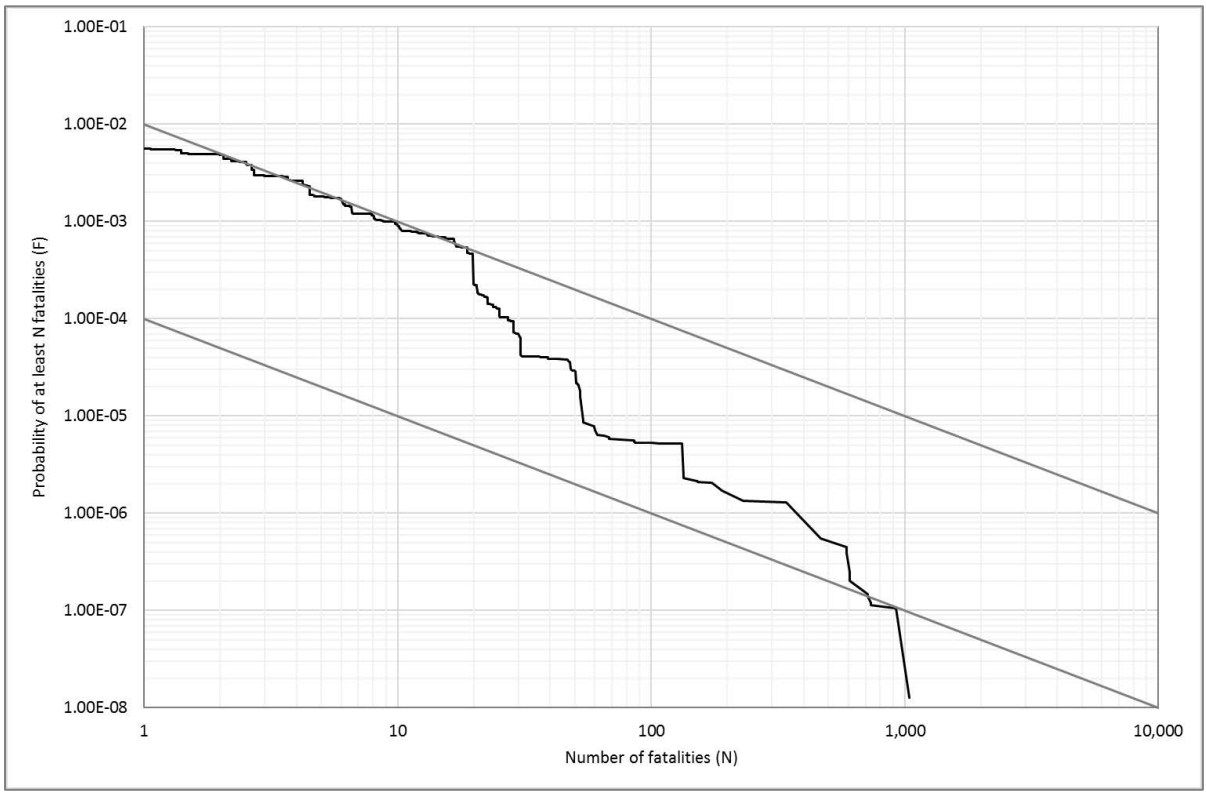
The reduction in the RI can be attributed to several factors, including the relocation of check-in facilities, queueing and stacking areas for both tourist vehicles and goods vehicles further away from the sources of major accident hazards (the COMAH establishments), as well as the overall reconfiguration of the road network in the eastern end of the Port. Overall, the societal risk for the post-MP2 Project satisfies the HSA's criteria for societal risk as it lies below the significant region, and represents a reduction in societal risk compared to the current Port configuration.

6.2.3 FN Curves

6.2.3.1 Current Port Layout

As outlined in Section 4.2.2, the societal risk can also be assessed by means of an FN curve. Using the same set of data underlying the risk integral (1,545 events, each with a probability of occurrence, *f*, and an estimated number of fatalities, *N*), yields the FN curve for the current layout of the Port shown in Figure 6.

Figure 6: FN Curve for Current Port Layout



This shows that the FN curve lies largely within the ALARP (significant) region and the broadly acceptable region. The FN curve touches the upper criterion line briefly, between an N of 2 and 6 and again between an N of 14 and 19. However, as noted in Section 4.2.2, societal risk criteria should not *… be viewed as more than broad indicators of a desirable objective, with many other, non-technical factors needing to be weighed in any final decision*.

In this context, we consider that the societal risk of the current arrangement in the Port can be considered tolerable, taking into account the conservative assumptions underlying this assessment, the estimates for the number of people that may be present in the Port at any one time, and as the FN curve is based on an aggregation of risk across ten separate COMAH establishments .

6.2.3.2 Post-MP2 Project

The FN curve for the layout of the Port following the MP2 Project is shown in Figure 7 and the combination of the current (undeveloped) layout and the post-MP2 development layout is shown in Figure 8 for comparison.

Figure 7: FN Curve for MP2 Development

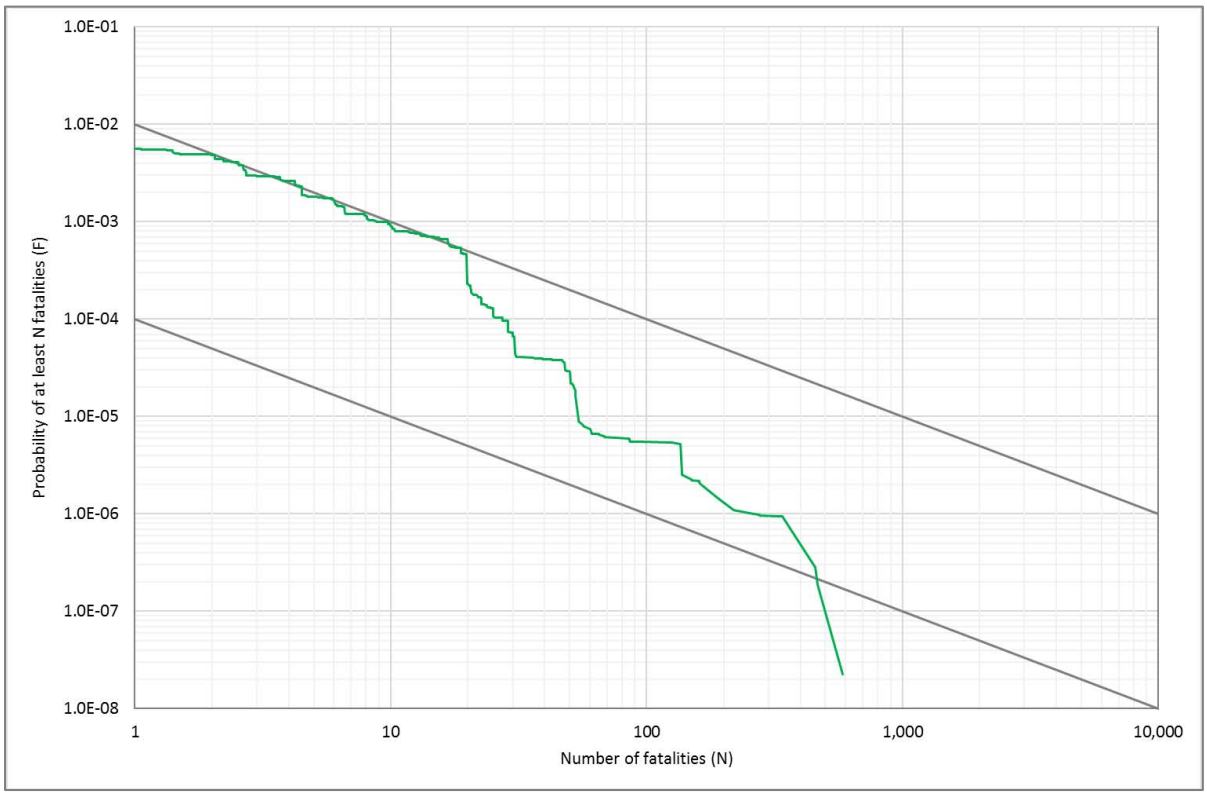
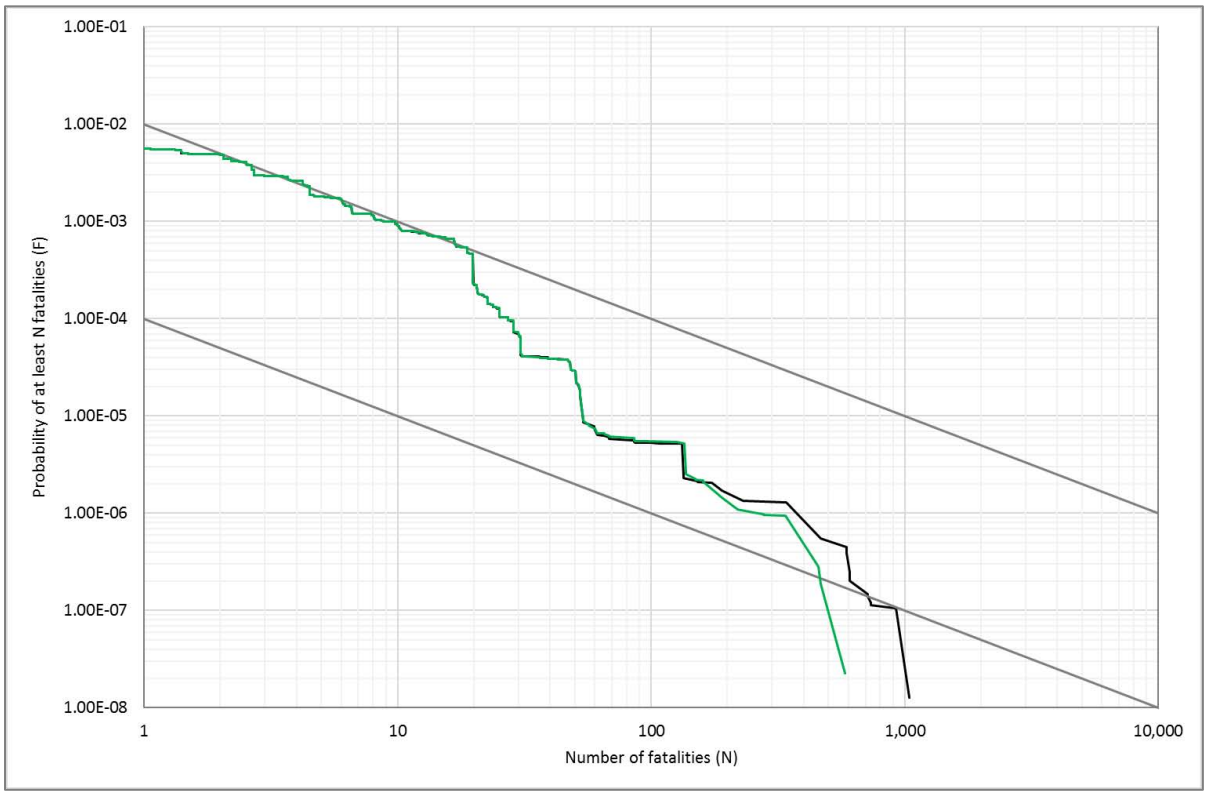


Figure 8: Comparison of FN Curves – Current & Post-MP2 Project Layouts



Again, this shows that the curve lies largely within the ALARP (significant) region and the broadly acceptable region. As in the case of the RI, the FN curve for the post-MP2 Project layout of the Port shows a reduction in the societal risk, which can be attributed to the same factors (the relocation of receptors further from the sources of the major accident hazards).

7 EMERGENCY RESPONSE MANAGEMENT

7.1 Introduction

Dublin Port's approach to Emergency Response Management is described in the following sub-sections, in the context of the potential for major accident hazards to arise at the COMAH establishments and, more generally, for other incidents and accidents that may arise across the Port estate.

7.2 Dublin Port Traffic Management

There are three access / egress points within the Port:

- The main entrance to and exit from the Port is on Promenade Road, which is manned 24 hours per day, 7 days per week, 365 days a year, by An Garda Síochána.
- The entrance to / exit from the Port on Tolka Quay Road is normally closed to traffic, but it can be opened in the event of an emergency in consultation with DCC and An Garda Síochána.
- The entrance to / exit from the Port on Alexandra Road is normally open and is manned 24 hours per day, 7 days per week, 365 days a year, by An Garda Síochána. This entrance / exit provides access to DPC's administration / office building and to parts of the commercial and industrial areas of the Port; in normal operation, it is not used for access to / egress from ferry Terminals 1, 2 or 5.

These three entrances / exits provide access to / from the three main roads running east-west: Promenade Road, Tolka Quay Road and Alexandra Road. The normal traffic routes through the Port for the majority of traffic, and in particular for the traffic accessing Terminals 1, 2 and 5 is via the main entrance on Promenade Road to the roundabout at the junction with Bond Drive Extension.

In the event of an incident, traffic can either be held by the Harbour Police and Dublin Port Security at a safe location, depending on the location and nature of the incident / emergency, or alternatively it can be diverted onto one of the other east-west (or adjoining roads) to facilitate egress from the Port. The main diversion routes that have been established by the Port for emergency access are included in Appendix 5. DPC implements these diversion routes on a regular basis, not due to incidents in the Port, but rather due to closures in the Dublin tunnel which requires traffic to be diverted in conjunction with DCC, An Garda Síochána and Transport Infrastructure Ireland (TII).

If an incident at one of the COMAH establishments resulted in a bund or unbunded fire at or immediately adjacent to one of the primary access roads (e.g. on Tolka Quay Road), the Port would activate its emergency procedures and divert any traffic from the eastern end of the Port (e.g. disembarking traffic from the ferry terminals) via Dublin Ferryport Terminal (DFT) (diversion route 1 on the drawings in Appendix 5). In addition, the Port has significant capacity to store cargo (tourist cars & HGV) at a combination of Terminals 1, 2, 5, depending on the nature and location of the particular event requiring the emergency action. The holding areas at Terminals 1 and 5 are located in the outer zone or outside the outer zone.

Overall, the Port has two normally open routes in / out (via Promenade Road and Alexandra Road) and a back-up route (via Tolka Quay Road). Given the layout of the Port and the location of the COMAH establishments, a major accident at one establishment is unlikely to affect access via all three routes, and in all but the largest events, an event is only likely to affect one of the three

routes. Therefore, the Port will always have an alternative route to provide access to / egress from the estate.

7.3 Dublin Port Security

DPC operates its own Harbour Police & Port Security, which is present 24 hours per day, 7 days per week, 365 days a year. Two patrol vehicles operate at all times in conjunction with An Garda Síochána, and the Port has a close working relationship with DCC, the operator of the Dublin Port Tunnel, and TII. In addition, DPC has a comprehensive CCTV system across the estate, with over 130 camera locations monitoring the complete road network and port infrastructure, with the system monitored by Harbour Police & Port Security 24 hours per day, 7 days per week, 365 days a year. Therefore, in the event of an incident on the road network, or an incident at a COMAH (or other facility) within the Port requiring the diversion of traffic, the Port can respond immediately and co-ordinate directly with the relevant emergency services.

7.4 Dublin Port Emergency Management Plan

7.4.1 Summary

As set out in *A Framework For Major Emergency Management* (produced by the National Steering Committee for Major Emergency Management), the *Harbours Act* places responsibility on the Harbour Master for the safety of shipping and all activities within the defined port limits. The legislation also requires that emergency plans be prepared in respect of the major ports. These emergency plans are designed generally to deal with incidents, in the first place using the port's own resources. Each port is also required to prepare an oil pollution plan to deal with oil pollution incidents, and responsibility for implementing the plan rests with the harbour master. Where COMAH establishments are located within a port (or harbour), the port authority is designated as a local competent authority and as such is included in the relevant external emergency planning process.

In this context, DPC has developed its *Emergency Management Plan*, the aim of which is to set out the structures and arrangements that will be used in response to an emergency to mitigate:

- loss of life or injury to employees, contractors, visitors and local residents
- damage to the environment
- damage to the facilities, plant and equipment within the port, its commercial partners, tenant companies and neighbours

The plan also aims to ensure that DPC emergency management structures and arrangements are compatible with the requirements of the *Framework for Major Emergency Management*.

The actions to be taken in an emergency are decided by the Emergency Management Team (EMT) and the plan itself may be activated by the Chief Executive Office, the Emergency Management Marine Coordinator (EMMC), or the Emergency Management Land Coordinator (EMLC), depending on the circumstances and severity of the incident.

The plan is designed to cater for both marine and land-based emergencies; land emergency scenarios may include:

- major fire within the general port area
- major oil spill

- major spill of hazardous material
- a vehicle accident involving hazardous material
- chemical incidents (e.g. toxic cloud)
- major incident in an oil, gas or hazardous material storage facility

The *Dublin Port Emergency Management Plan* also contains several scenario-specific sub plans for the individual types of emergency scenario, which focus on the immediate actions to be taken by internal sections of the port authority.

7.4.2 Dublin Port Alarm

The DPC fire alarm panel system is located in the Harbour Police / Port Security Control Room, situated on the ground floor of the Port Operations Centre. The fire alarm system monitors approximately 21 sites, and break glass units are located throughout the Port estate.

The fire alarm system can be activated manually or automatically from various points around the Port directly linked to the system. When activated, the Harbour Police / Port Security are immediately alerted and investigate the alarm before deciding on what action is required. The port wide sirens are located at the ESB North Wall Generating Station, the oil jetties, and DP Warehousing. With the exception of alarm tests, all pumping stops immediately on sounding of the Port-wide siren. Fire Wardens on the oil jetties communicate with all Common Oil Pipeline[24] users by VHF radio.

For confirmed alarm activations, the affected site and Harbour Police / Port Security request the attendance of the emergency services, advising them of the nature of the emergency, name and location of the site affected using the ETHANE pneumonic:

- **E**xact location of the emergency
- **T**ype of emergency (e.g. fire; hazardous material spill; road traffic accident)
- **H**azards (present and potential)
- **A**ccess route to the emergency
- **N**umber and type of casualties (if known)
- **E**mergency Services (those present and those required)

Once confirmed, the Harbour Police / Port Security immediately open the emergency gates located at the western end junction of Tolka Quay Road and East Wall Road, and this immediate area operates as the emergency services rendezvous point. Dublin Fire Brigade will be dispatched to the Port to deal with the incident, whilst the Harbour Police / Port Security will implement a traffic control plan, with the support of An Garda Síochána, as required.

The Port-wide alarm system is a continuous wailing alarm sound. On hearing this alarm, Port users should:

[24] The Common Oil Pipeline (COP) is used for transferring petroleum products from the oil berths to the various oil storage sites (including the eight COMAH establishments that store petroleum products), and for transferring LPG to the Calor establishment. The COP comprises separate pipelines for different products, including LPG, gasoline, kerosene, gas oil and bitumen (to three facilities that store bitumen and that are not subject to the COMAH Regulations). The COP is outside the scope of the COMAH Regulations.

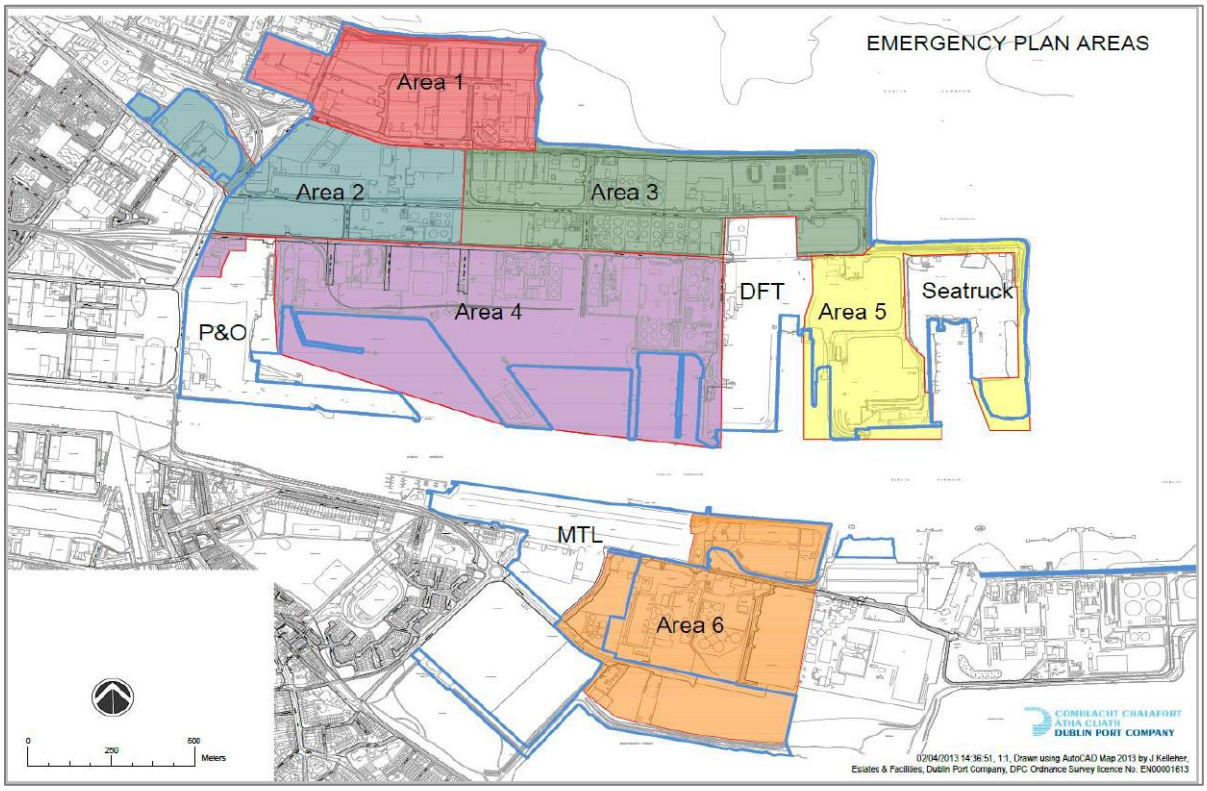
- Be aware that an incident is ongoing.
- Account for staff, visitors and contractors.
- Continue to operate as normal unless instructed otherwise, or individual company standard operating procedures indicate otherwise.
- Wait for further instructions from the Harbour Police / Port Security or the Principal Emergency Services[25].

Port users should await further information from the Harbour Police / Port Security, whilst members of the public should tune in to a national radio station for updates.

7.4.3 Port Evacuation

During an emergency it may be necessary to evacuate the Port, or parts of the Port. The Port is divided into six separate areas for evacuation planning purposes, as shown in Figure 9. The Harbour Police / Port Security control traffic flow throughout the Port in the event of an evacuation of one or more areas (as described in Section 7.2).

Figure 9: Dublin Port Company Evacuation Areas



[25] An Garda Síochána, the Ambulance Service and the Fire Service. A fourth principal emergency service, the Irish Coast Guard, is responsible for the initiation, control and co-ordination of maritime emergencies in the Irish territorial waters, harbours and coastline.

7.5 Dublin City Council Major Emergency Plan

Dublin City Council, the relevant Garda Division and Health Service Executive District are the principal response agencies (PRA) charged with managing the response to emergency situations that arise within Dublin City Council's administrative boundary. The Dublin City Council Major Emergency Plan is supported by, and is compatible with, the major emergency plans of An Garda Síochána and the Health Service Executive. In certain circumstances, the local response may be escalated to regional level, thus activating the plan for regional level co-ordination. If this is activated, the management of the incident is coordinated from a regional perspective.

Several specific local plans, such as the response plan to flood emergencies, remain in place as standalone plans, which can be implemented under the general arrangements and structures set out in the plan. Certain types of emergency have a particular focus, thus enabling a hazard or site-specific plan to be activated. Sub-plans deal with a range of incidents, such as severe weather emergencies, large crowd events and hazardous substances storage sites (such as COMAH establishments).

In the Dublin City Council administrative area there are eight upper tier establishments notified to the HSA, for which interagency specific off-site plans have been prepared. In addition, the Port (which lies within the Dublin City Council administrative boundary) has prepared emergency plans and maintains emergency services commensurate with the hazards within the port boundary. Dublin Port authorities generally request the attendance of the principal emergency services at alerts, incidents and exercises at the facility. Where appropriate, a major emergency may be declared by the principal response agencies when responding to an incident in Dublin Port.

Dublin Fire Brigade provides the primary response to emergencies in the city and to the Port. The Council supports this response by providing amongst others, the following functions:

- coordinating the delivery of services from all council departments
- making buildings such as leisure and community centres available to people displaced by the emergency
- providing a volunteer civil defence organisation
- providing advice and assistance with clean up after major flooding or pollution
- assessing structural damage to buildings
- co-ordinating and leading multi-agency meetings to plan community recovery

Overall, and in accordance with the requirements of A Framework for Major Emergency Management, the Dublin City Council Major Emergency Plan has been prepared to facilitate the response to, and recovery from major emergencies as well as ensuring the Council's arrangements are coordinated with those of the other designated principal response agencies, the Health Service Executive and An Garda Síochána.

7.6 Emergency Response Exercises

The Port conducts regular emergency response exercises across its estate (2 no. half-day exercises a year), covering incidents at the COMAH establishments in co-ordination with the operators of the establishments and with the emergency services, incidents at other facilities in the Port, road traffic incidents including incidents outside the Port estate that can have a knock-on effect on traffic within the Port, and incidents at the ferry terminals or berths. These exercises test the Port's procedures, response actions and the resources that may be deployed (personnel and emergency response equipment), thereby ensuring that the Port is well prepared to respond to an incident or emergency.

7.7 Dublin Port Dangerous Cargoes Bye-laws

In addition to the obligations on operators of COMAH establishments under the COMAH Regulations, and on the obligations of vessels and goods vehicles transporting dangerous goods under the *European Agreement concerning the International Carriage of Dangerous Goods by Road* (ADR) and the *International Maritime Dangerous Goods* (IMDG) Code, dangerous goods within the port estate are governed by the *Dublin Port Bye-Laws - Dangerous Goods (Cargoes) 2014*. Table 16 lists the classes and divisions of dangerous goods that are subject to the byelaws.

Table 16: Classification of Dangerous Goods

Class	Division	Dangerous Goods
2	-	Gases
	2.1	Flammable Gases (e.g. LPG, acetylene, natural gas)
	2.2	Compressed non-flammable gases (e.g. nitrogen, argon)
	2.3	Toxic gases (e.g. chlorine, sulphur dioxide, ammonia)
3	-	Flammable liquids (e.g. petrol, kerosene, solvents)
4.1	-	Flammable solids, self-reactive substances and solid desensitized explosives
4.2	-	Substances liable to spontaneous combustion
4.3	-	Substances which on contact with water emit flammable gasses.
5.1	-	Oxidising substances (e.g. ammonium nitrate, solid pool chlorine)
5.2	-	Organic peroxides (e.g. methyl ethyl ketone peroxide – MEKP)
6.1	-	Toxic Substances (e.g. sodium cyanide, pesticides)
6.2	-	Infectious substances (e.g. medical waste)
7	-	Radioactive material (e.g. monazite, uranium)
8	-	Corrosive substances (e.g. sulphuric acid, caustic soda, hydrofluoric acid)
9	-	Miscellaneous dangerous substances and articles

The byelaws regulate the movement and storage of dangerous goods within the Port:

- arrival by sea in packaged form, in liquid bulk or in solid bulk
- departure by sea
- arrival by road or rail
- storage / staging in the Port estate

In the context of storing / staging dangerous goods within the Port, including at the COMAH establishments, the byelaws require that:

> *7.4.1 All Port Terminals and tenants must have a Company approved Dangerous Goods Storage and Emergency Response Plan. The Plans must be reviewed annually and are subject to inspection by the Company.*

7.4.2 All Port Terminals and tenants must have in place a Dangerous Goods Inventory in an approved format on site and available for inspection by the Company at all times and inventories must be emailed to dg@dublinport.ie each day the terminal or tenant premises operate.

7.4.3 All Port Terminals and tenants must hold and have readily available Safety Data Sheets for all Dangerous Cargoes stored on their site.

7.4.4 All Port Terminals and tenants must carry out an annual exercise of their emergency response plan and document for audit purposes.

7.4.5 All Port Terminals storing, staging or loading / unloading Dangerous Goods must have a qualified Dangerous Goods Safety Advisor (DGSA) employee certified by a HSA approved training organisation.

7.4.6 The Company recommends all facilities storing or staging Dangerous Goods should have a Chemical Risk Assessment completed and staff involved complete a Dangerous Goods Awareness Course.

7.4.7 The Harbour Master, his nominee or authorised officer or representative of the Company may under exceptional circumstances allow by written authorisation that dangerous goods may be temporarily stored at the Port. Note exceptional circumstances exclude matters of commercial gain or expediency.

7.4.8 All Port Terminals and tenants requesting derogation of storage time and quantity must do so in writing to the Company stating Dangerous Goods class (UN specific) and must be accompanied by risk assessment and relevant Safety Data Sheet.

8 CONCLUSIONS

Based on this conservative assessment, it is considered that the proposal for the MP2 Project within Dublin Port would satisfy the HSA's criteria under its land use planning guidelines. The aspects of the proposed MP2 Project within the inner zone may be classified as Sensitivity Level 1 and are, therefore, consistent with the HSA's criteria for individual risk.

Approximately 30% of the overall area of the MP2 Project (the land-side and marine-side development) lies within the COMAH land use planning zones (summarised in Table 17 and shown in Appendix 4), with the majority of the development lying outside the zones. Of the land-side development (comprising approximately 45% of the overall area of the development), approximately 67% lies within the COMAH land use planning zones.

Table 17: Summary of MP2 Project Areas & COMAH LUP Zones

MP2 Project area	Total development		Land-side development (approximate)	
	Area (ha)	% of total area	Area (ha)	% of total area
Within 1×10^{-5} zone	13.5	8.6%	13.5	19.2%
Within 1×10^{-6} zone	14.2	9.0%	14.2	20.2%
Within 1×10^{-7} zone	19.2	12.3%	19.2	27.5%
Outside COMAH LUP zones	109.6	70.0%	23.1	33.0%
Total	156.4	100.0%	70.0	100.0%

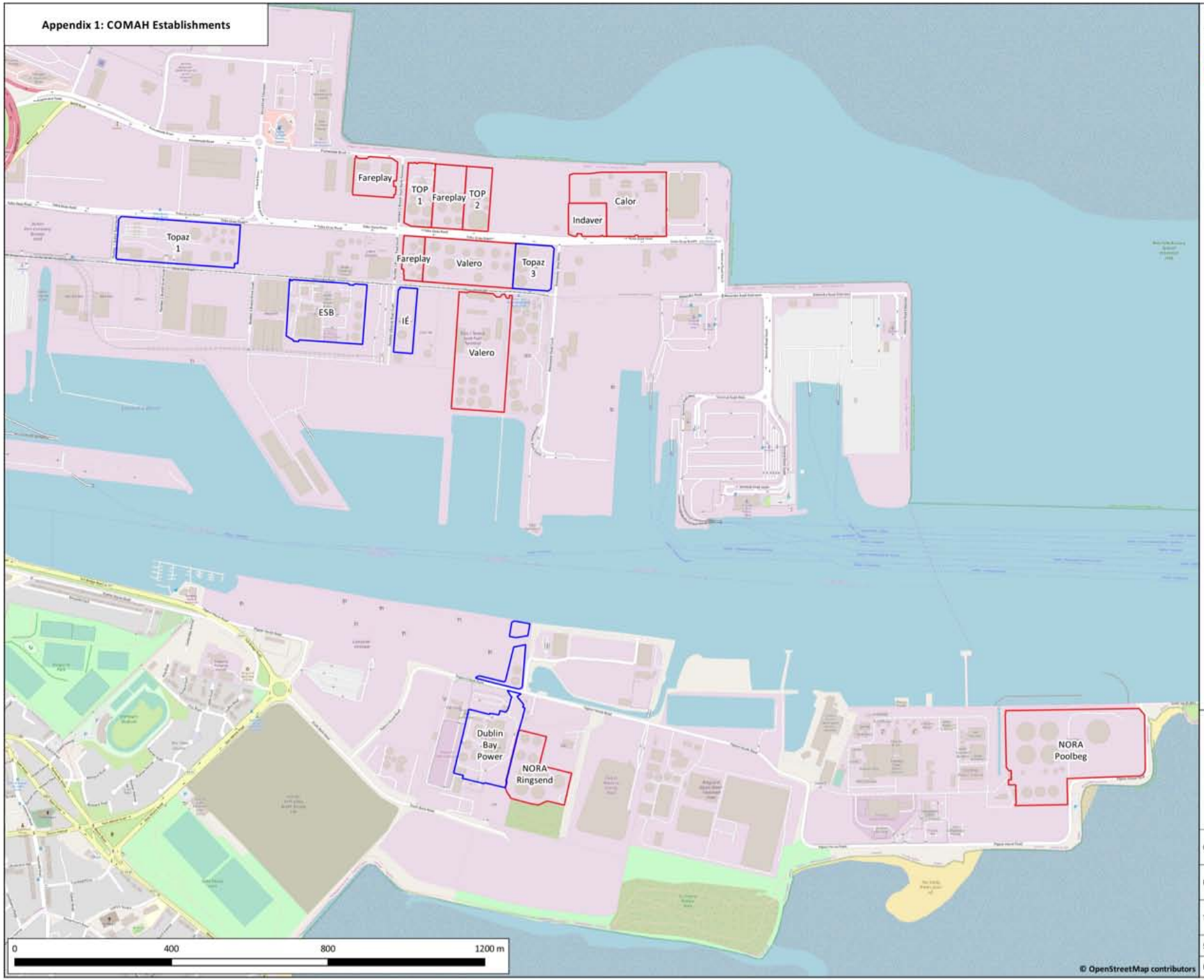
In the case of the societal risk criteria, the risk profiles for both the current Port layout and following the MP2 Project lie largely within the broadly acceptable and ALARP regions, with the FN curve for the MP2 Project showing a decrease in the risk profile. As noted in Section 4.2.2, societal risk criteria should not be viewed as more than broad indicators of a desirable objective, with many other, non-technical factors needing to be weighed in any final decision. In this context, and taking into account that the COMAH establishments are required to manage their establishments such that the risks are as low as reasonably practicable, it is concluded that the societal risk satisfies the HSA's land use planning criteria.

In addition, the Port has developed a comprehensive emergency management plan that caters for the range of accident and emergency events that may occur within its estate (or that may occur outside the estate and that have a direct, knock-on effect), and this plan is provided to the other relevant stakeholders, including An Garda Síochána, Dublin City Council, Transport Infrastructure Ireland, and the Principal Response Agencies. In the event of an incident at a COMAH establishment that could impact on people at other facilities in the Port, or on road traffic entering or exiting the Port, DPC will activate its emergency management plan, in which case people would be directed away from the source of the hazard. As it is not possible to model the different combinations of major accidents and the corresponding emergency response actions within the societal risk assessments, the estimated societal risk is concluded to be conservative.

Accordingly, it is concluded that the potential major accident risks arising from the proposed MP2 Project satisfy the Health and Safety Authority's COMAH land use planning guidance.

APPENDIX 1: COMAH ESTABLISHMENTS IN DUBLIN PORT

Appendix 1: COMAH Establishments



Legend

COMAH establishments

- Lower tier
- Upper tier

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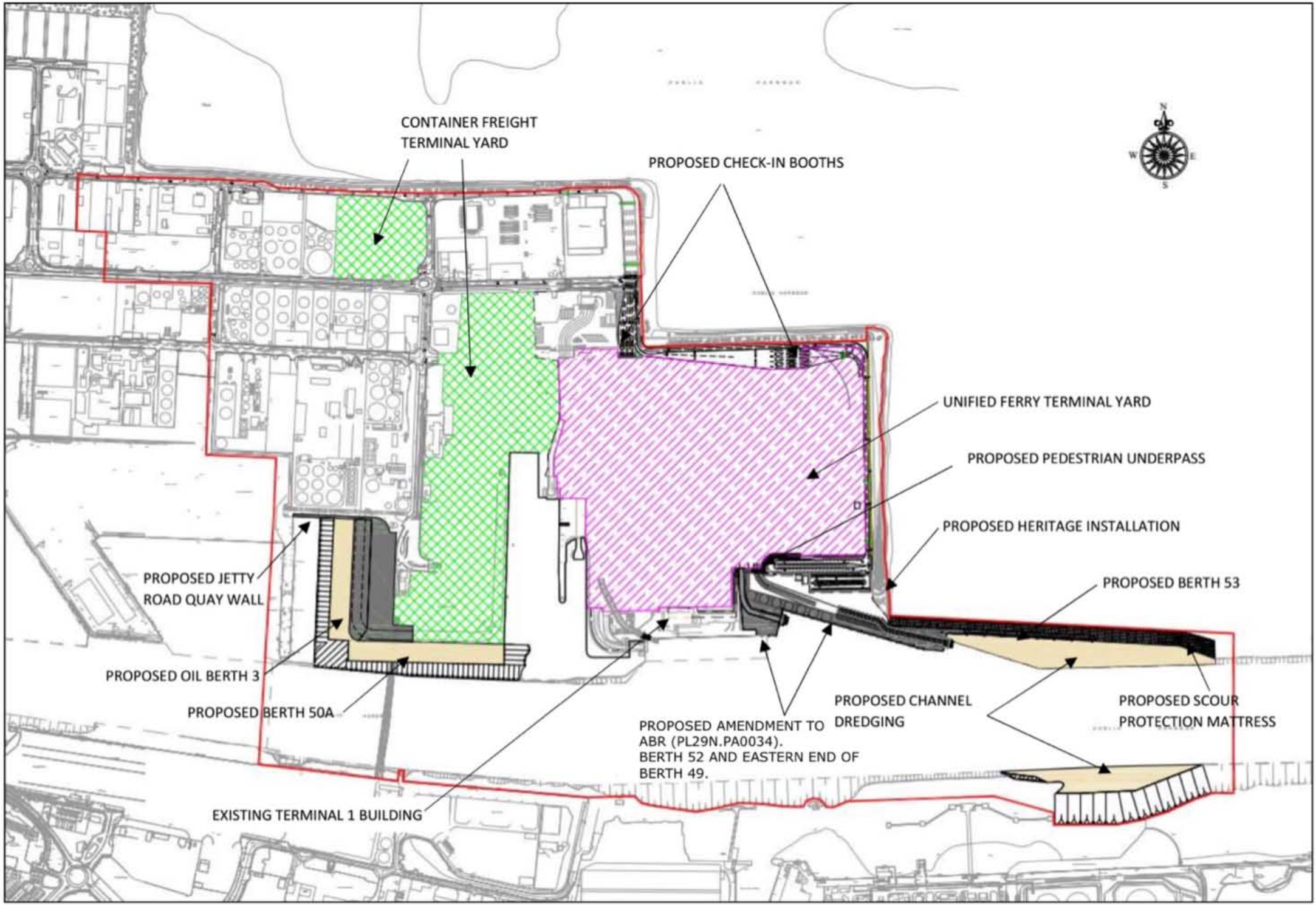
Client	RPS		
Project	COMAH Land Use Planning Assessment MP2 Project		
Title	COMAH Establishments in Dublin Port		
Scale	1:15,000	541-19X0055 A1	R1
FBS	541:14:03		

APPENDIX 2: DEVELOPMENT LAYOUT


CONTAINER FREIGHT
TERMINAL YARD
PROPOSED CHECK-IN BOOTHS
UNIFIED FERRY TERMINAL YARD
PROPOSED PEDESTRIAN UNDERPASS
PROPOSED HERITAGE INSTALLATION
PROPOSED BERTH 53
PROPOSED JETTY
ROAD QUAY WALL
PROPOSED OIL BERTH 3
PROPOSED BERTH 50A
PROPOSED AMENDMENT TO
ABR (PL29N.PA0034).
BERTH 52 AND EASTERN END OF
BERTH 49.
PROPOSED CHANNEL
DREDGING
PROPOSED SCOUR
PROTECTION MATTRESS
EXISTING TERMINAL 1 BUILDING
N
W
E
S

APPENDIX 3: POPULATION DATA

3.1 CSO Small Areas

3.2 Table 18: CSO Small Area Data

3.3 CSO Workplace Zones

3.4 Table 19: CSO Workplace Zone Data

3.5 Table 20: Dublin Port Estate Population

3.6 Dublin Port Berths

3.7 Table 21: Dublin Port Berth Occupancy (2018)

3.8 Table 22: Cruise Liner Data

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Client	RPS		
Project	COMAH Land Use Planning Assessment MP2 Project		
Title	CSO Small Areas		
Scale	1:15,000	541-19X0055 A3.1	R0
FBS	541:14:03		

Table 18: CSO Small Area Data

No.	CSO Small Area (SA) reference	Co-ordinates of SA centroid		SA centroid to centre of risk curves (km)	Residential population
		X	Y		
1	268042001	720208	736094	1.26	237
2	268042002	720235	735946	1.15	282
3	268042003	720416	735887	1.23	133
4	268042004	720474	735990	1.35	201
5	268042005	720386	735812	1.16	326
6	268042006	720660	736005	1.50	174
7	268042007	720885	736039	1.69	285
8	268042008	720563	736111	1.50	281
9	268042009	720621	736207	1.60	360
10	268042010	720232	736605	1.71	279
11	268042013	720688	736557	1.91	282
12	268042018	720325	736326	1.51	267
13	268042019	720169	736334	1.44	128
14	268042020	720474	736614	1.84	280
15	268042022	720852	736490	1.97	152
16	268042023	720722	736355	1.78	232
17	268042024	721047	736296	1.98	167
18	268042026	720968	736259	1.89	242
19	268042027	720293	736839	1.95	302
20	268043001	719786	736322	1.30	299
21	268043002	719826	736481	1.46	303
22	268043003	719386	736154	1.11	295
23	268043004	719450	736004	0.95	213
24	268043005	719795	735976	0.97	199
25	268043006	719759	736144	1.12	253
26	268043007	719725	736597	1.56	251
27	268043008	720018	736887	1.91	275
28	268043009	719781	736919	1.89	214
29	268043010	719679	736795	1.75	363
30	268043011	720008	736000	1.07	255
31	268043012	720009	736696	1.72	263

No.	CSO Small Area (SA) reference	Co-ordinates of SA centroid		SA centroid to centre of risk curves (km)	Residential population
		X	Y		
32	268044001	719429	737030	1.98	301
33	268044002	719365	736782	1.74	209
34	268044003	718919	736539	1.60	330
35	268044004	719028	736569	1.59	340
36	268044005	719238	736513	1.49	237
37	268044006	719115	736432	1.44	304
38	268044007	719348	736406	1.36	419
39	268044008	719015	736030	1.10	250
40	268044009	719024	736162	1.21	376
41	268048003	718482	736270	1.59	241
42	268048006	719067	737001	2.00	316
43	268048008	718136	736433	1.95	150
44	268048010	718375	736421	1.78	289
45	268048011	718495	736478	1.75	142
46	268048012	718778	736498	1.62	343
47	268048013	718622	736462	1.67	240
48	268048014	718726	736773	1.89	302
49	268048016	718410	736591	1.89	211
50	268048017	718619	736625	1.81	138
51	268049004	717788	736056	1.99	315
52	268108001	717765	735373	1.77	240
53	268108002	717731	735296	1.79	220
54	268108006	717573	735375	1.96	219
55	268108008/01	717742	734990	1.77	124
56	268108008/02	717900	735165	1.61	334
57	268108008/03	717784	735130	1.73	134
58	268108009	717641	735217	1.87	275
59	268108010	717727	735175	1.79	207
60	268108020	717815	734633	1.74	408
61	268108021/01	717765	734713	1.78	216
62	268108021/02	717873	734710	1.67	185
63	268108022	717574	735007	1.94	187

No.	CSO Small Area (SA) reference	Co-ordinates of SA centroid		SA centroid to centre of risk curves (km)	Residential population
		X	Y		
64	268108023	717567	735132	1.94	265
65	268108026 / 268108027	718874	734892	0.65	922
66	268108029/01	717578	734743	1.95	140
67	268108029/02	717709	734707	1.83	271

Appendix 3.3: CSO Workplace Zones

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Client	RPS		
Project	COMAH Land Use Planning Assessment MP2 Project		
Title	CSO Workplace Zones		
Scale	1:15,000	541-19X0055 A3.3	R0
FBS	541:14:03		

Table 19: CSO Workplace Zone Data

No.	CSO Workplace Zone reference	Co-ordinates of workplace centroid		Workplace centroid to centre of risk curves (km)	Residential population
		X	Y		
1	DC0141	720535	736708	1.95	1187
2	DC0142	720870	736260	1.82	589
3	DC0143	720435	735856	1.23	587
4	DC0144	720385	736164	1.42	944
5	DC0145	719883	736903	1.89	950
6	DC0146	719780	736919	1.89	807
7	DC0147	719425	736656	1.61	848
8	DC0148	719785	736321	1.30	1547
9	DC0149	720008	736004	1.08	851
10	DC0150	719396	736076	1.03	743
11	DC0151	719429	737035	1.99	330
12	DC0152	718953	736516	1.57	653
13	DC0160	718354	736299	1.70	367
14	DC0161	718415	736481	1.80	669
15	DC0164	718656	736230	1.45	173
16	DC0170	717786	736055	1.99	456
17	DC0326	717625	735185	1.89	840
18	DC0331	717794	734709	1.75	359
19	DC0332	717816	734634	1.74	661
20	DC0333	717988	734483	1.62	192
21	DC0334	719898	734599	0.60	343
22	DC0335	719692	735016	0.19	260
23	DC0336	719088	734589	0.62	648
24	DC0337	718980	735015	0.53	210
25	DC0338	718250	734875	1.27	412
26	DC0339	717824	735091	1.68	651
27	DC0340	718345	735225	1.18	394
28	DC0341	717858	735497	1.71	192
29	DC0342	717927	735681	1.70	764
30	DC0343	717983	735633	1.63	391

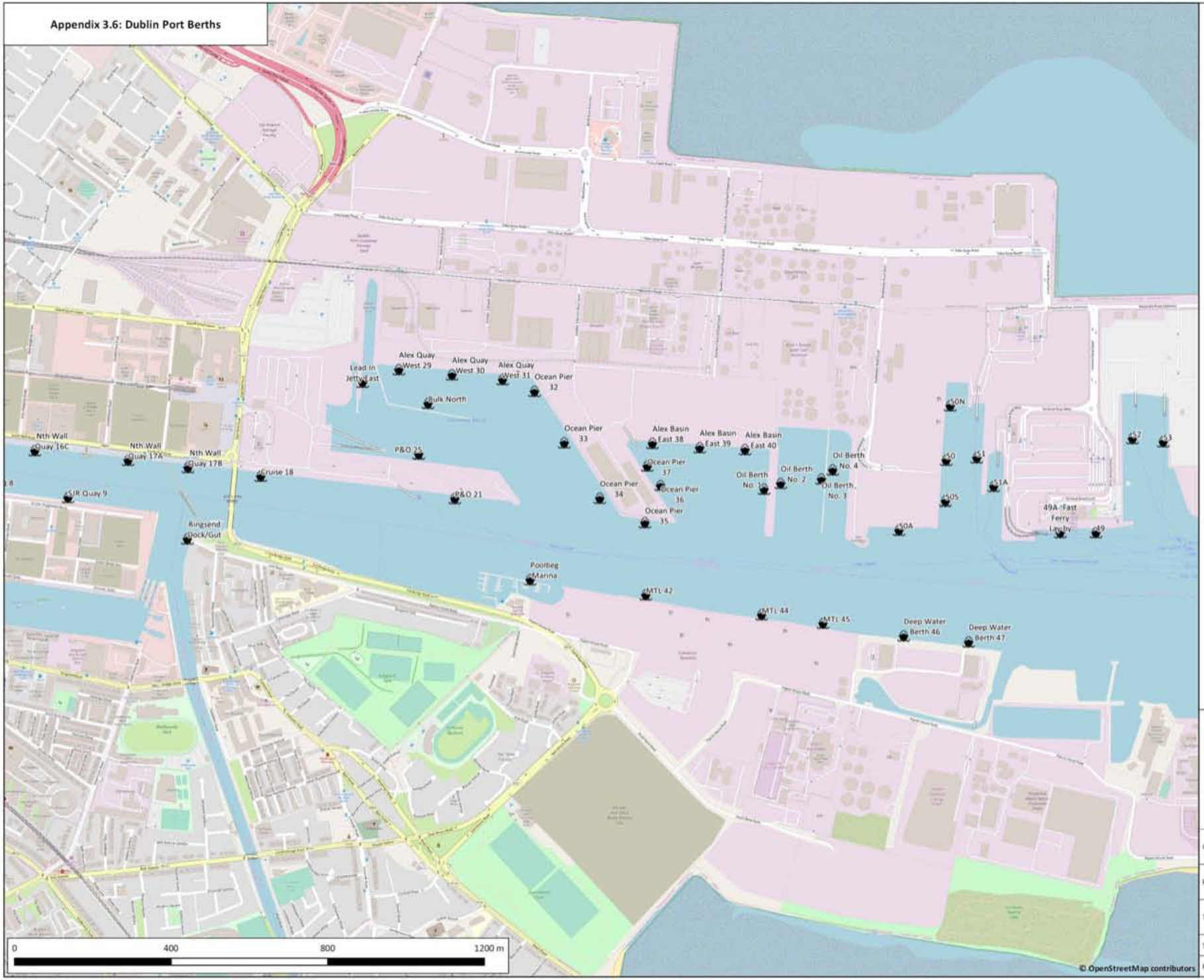
No.	CSO Workplace Zone reference	Co-ordinates of workplace centroid		Workplace centroid to centre of risk curves (km)	Residential population
		X	Y		
31	DC0344	718116	735667	1.52	1389
32	DC0345	718237	735625	1.40	874
33	DC0346	718196	735488	1.38	218
34	DC0347	718373	735454	1.20	643
35	DC0348	718643	735400	0.93	154
36	DC0349	718963	735388	0.64	175
37	DC0350	717990	734667	1.57	404
38	DC0351	717702	735563	1.88	215
39	DC0352	718098	735532	1.49	224
40	DC0353	718215	735444	1.35	311
41	DC0354	718400	735598	1.24	383
42	DC0668	718532	733794	1.59	876
43	DC0669	718192	733672	1.91	762
44	DC0670	718054	733851	1.89	343
45	DC0671	718044	734100	1.75	1161
46	DC0672	719028	733644	1.49	232
47	DC0673	720522	733603	1.77	168
48	DC0674	719645	733618	1.44	139

Table 20: Dublin Port Estate Population

Facility / location	Estimated population	% indoor	% outdoor
Blackhorse Transport Ltd	10.0	70%	30%
Bord na Móna	2.0	100%	0%
Calor - office & maintenance	17.0	100%	0%
Calor north site	1.0	0%	100%
Cobblefret Office	2.0	100%	0%
Container parking	6.0	100%	0%
Custom House	100.0	100%	0%
Dareland Enterprises	12.0	100%	0%
Dublin Container & Transport Services	5.0	100%	0%
Dublin Ferryport Container	25.0	24%	76%
Dublin Ferryport offices + Weighbridge	30.0	83%	17%
Dublin Port Co HQ - Port administration offices	84.0	100%	0%
Dublin Port Service Station	15.0	100%	0%
Dublin Stevedore office & canteen	25.0	20%	80%
ESB Northwall Generating Station (security only)	6.0	50%	50%
Valero (north)	2.0	100%	0%
Valero (south)	15.0	100%	0%
Fareplay No. 1 Yard		0%	100%
Fareplay No. 2 Yard		0%	100%
FSK Freight Services Limited	20.0	25%	75%
Gwynedd Shippin	3.0	100%	0%
Heiton Buckly Ltd	8.0	100%	0%
Former Henry Crosbie (Dublin Port Warehouses)	45.0	100%	0%
Indaver	30.0	80%	20%
Irish Bitumen Storage	10.0	80%	20%
Irish Continental Group	50.0		100%
Irish Ferries Freight Offices	43.0	100%	0%
Irish Ferries Offices	60.0	100%	0%
Irish Rail	0	0%	100%
Irish Tar & Bitumen	15.0	80%	20%
Lagan Bitumen Offices	5.0	80%	20%

Facility / location	Estimated population	% indoor	% outdoor
M & S (Dub Port Service & maintenance)	50.0	100%	0%
Molloy & Sherry Eirfreeze	30.0	83.33%	16.67%
Molloy & Sherry Transport	10.0	100%	0%
Montgomery Transport	11.0	45.45%	54.55%
Moyglare Holdings	5.0	100%	0%
Odlums	5.0	100%	0%
O'Reilly Transport	20.0	100%	0%
Otter Engineering	10.0	100%	0%
Port Operations Centre	25.0	100%	0%
R & H Hall	15.0	100%	0%
RA Burke Offices	80.0	62.50%	37.50%
Referecare	11.0	45.45%	54.55%
Revenue Commissioners	2.0	100%	0%
Rubbshed	2.0	100%	0%
Stack"C"	20.0	100%	0%
Storecon Ltd	2.0	100%	0%
Tanktrans Ltd	2.0	100%	0%
Tara Mines	2.0	100%	0%
Tedcastle Oil 1	3.0	80%	20%
Tedcastle Oil 2		80%	20%
Terminal 5 (offices)	20.0	80%	20%
Trim Transport	12.0	33%	67%
Wincanton Group Ltd (Stobart)	51.0	69%	31%
Woodside Ireland	2.0	100%	0%
Topaz 1	20.0	100%	0%
Topaz 3	2.0	100%	0%
Topaz Fareplay	10.0	100%	0%

Appendix 3.6: Dublin Port Berths



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Client	RPS		
Project	COMAH Land Use Planning Assessment MP2 Project		
Title	Dublin Port Berths		
Scale	1:15,000	541-19X0055 A3.6	R0
FBS	541:14:03		

Table 21: Dublin Port Berth Occupancy

Berth	Number of days occupied	% of time occupied	Estimated population range
49	183.5	50.27%	500 - 2,200
50	1.7	0.46%	10 - 15
51	197.6	54.13%	23 - 1,500
52	172.0	47.14%	8 - 35
53	198.6	54.40%	10 - 35
49A	37.4	10.25%	900
50A	140.2	38.42%	15
50N	217.8	59.67%	15
50S	194.7	53.35%	10 - 15
51A	205.8	56.39%	23 - 2,200
Alex Basin East 38	57.7	15.81%	10 - 31
Alex Basin East 39	139.3	38.16%	10 - 1,718
Alex Basin East 40	44.5	12.19%	10 - 15
Alex Quay West 29	25.1	6.89%	3 - 25
Alex Quay West 30	244.9	67.08%	8 - 2,112
Alex Quay West 31	12.2	3.33%	8 - 820
Bulk North	141.3	38.70%	10 - 15
C.Link 25	0.1	0.02%	10
Cruise 18	186.1	50.97%	0 - 1,885
D.L.2	17.5	4.79%	35 - 372
D.L.4	68.4	18.75%	0 - 372
Deep Water Berth 46	182.1	49.90%	3 - 2,728
Deep Water Berth 47	157.8	43.25%	8 - 146
MTL 41	0.5	0.14%	15
MTL 42	164.2	44.99%	10 - 15
MTL 43	0.1	0.04%	10
MTL 44	204.9	56.13%	10 - 6,036
MTL 45	79.8	21.85%	10 - 15
Nth Wall Quay 17A	16.2	4.45%	5 - 24
Nth Wall Quay 17B	16.3	4.47%	28
Ocean Pier 32	21.1	5.78%	10 - 820
Ocean Pier 33	121.0	33.16%	10 - 6,036
Ocean Pier 34	11.2	3.07%	8 - 44
Ocean Pier 35	168.3	46.12%	3 - 590
Ocean Pier 36	1.7	0.45%	10 - 1,718

Berth	Number of days occupied	% of time occupied	Estimated population range
Ocean Pier 37	158.6	43.46%	8 - 2,112
Oil Berth No. 1	221.6	60.72%	10
Oil Berth No. 2	268.6	73.59%	10
Oil Berth No. 3	65.2	17.88%	10 - 23
Oil Berth No. 4	11.8	3.23%	10
P&O 21	204.4	56.00%	35 - 357
P&O 25	88.8	24.33%	0 - 2,000
Poolbeg Marina	78.5	21.52%	3 - 18
Ringsend Dock/Gut	3.1	0.85%	5
Sir JRQ 7	114.2	31.27%	0 - 84
Sir JRQ 8	88.5	24.24%	13 - 186
SJR Quay 9	26.6	7.28%	16 - 153
SJR Quay 10	46.7	12.79%	0

Notes:

1. Estimated berth occupancies are based on DPC Port arrival & departure data for 2018 (available at http://booking.dublinport.ie/webx/)
2. Estimated berth populations are based on the typical complement for the types of vessel moored at the berths. For larger vessels (cruise ships and passenger vessels), the estimates are based on the available data for passenger and crew capacities.

Table 22: Cruise Liner Data

Vessel	2018 visits	Days in port	Capacity		
			Crew	Passengers	Total
Aegean Odyssey	1	1.29	180	380	560
Aidaaura	2	1.73	418	1,300	1,718
Aidavita	1	0.59	426	1,266	1,692
Albatros	2	1.53	424	812	1,236
Amadea	1	0.55	292	624	916
Artania	1	0.58	537	1,260	1,797
Astor	3	1.16	300	650	950
Astoria	6	2.90	274	556	830
Asuka Ii	1	0.58	545	960	1,505
Aurora	3	2.79	850	1,878	2,728
Azamara Journey	1	0.72	407	694	1,101
Azamara Pursuit	1	0.59	380	777	1,157
Berlin	3	7.07	180	412	592
Boudicca	2	0.88	329	881	1,210
Braemar	1	0.61	371	929	1,300
Brilliance of the Seas	4	4.58	859	2,501	3,360
Celebrity Eclipse	7	7.57	1,271	2,850	4,121
Celebrity Silhouette	1	1.55	1,500	2,886	4,386
Columbus	5	2.88	700	1,856	2,556
Corinthian	13	8.65	70	100	170
Crystal Serenity	1	1.18	655	980	1,635
Disney Magic	1	0.51	950	2,700	3,650
Europa	1	0.46	275	408	683
Europa 2	1	0.68	370	516	886
Hamburg	3	1.43	170	420	590
Hebridean Princess	1	0.75	38	49	87
Island Sky	1	0.71	70	116	186
Le Boreal	1	0.59	136	264	400
Le Soleal	2	0.86	139	264	403
Magellan	8	4.73	660	1,452	2,112
Marco Polo	4	2.71	356	820	1,176
Marina	2	1.37	780	1,252	2,032
Mein Schiff 3	5	3.76	1,000	2,506	3,506
MSC Meraviglia	2	1.40	1,536	4,500	6,036

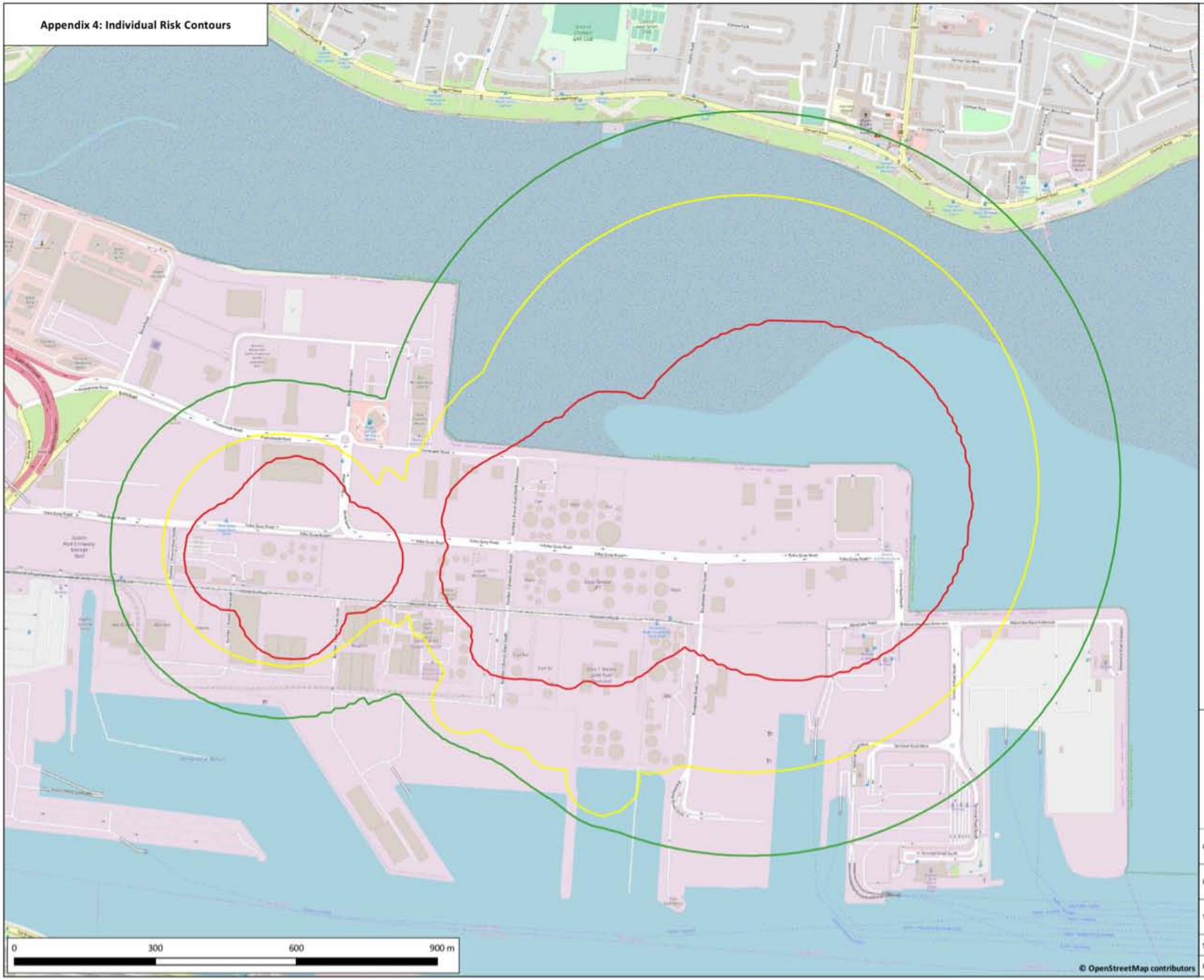
Vessel	2018 visits	Days in port	Capacity		
			Crew	Passengers	Total
Nautica	4	2.57	386	824	1,210
Norwegian Jade	2	1.20	1,037	2,402	3,439
Ocean Dream	1	0.54	550	1,022	1,572
Ocean Majesty	2	1.04	257	621	878
Oriana	2	0.99	794	1,928	2,722
Pacific Princess	4	2.24	350	750	1,100
Prinsendam	2	2.14	443	835	1,278
Queen Elizabeth	1	0.52	996	2,547	3,543
Queen Victoria	1	0.48	900	2,081	2,981
RCGS Resolute	1	0.52	125	184	309
Regal Princess	1	0.51	1,346	3,560	4,906
Rotterdam	1	1.51	600	1,404	2,004
Royal Princess	11	9.76	1,346	3,600	4,946
Saga Pearl II	1	0.65	252	449	701
Saga Sapphire	1	0.60	406	1,158	1,564
Sea Cloud II	1	0.57	63	96	159
Seabourn Ovation	1	0.48	330	604	934
Seabourn Quest	1	0.72	335	450	785
Seven Seas Explorer	1	0.47	552	750	1,302
Seven Seas Navigator	1	0.53	340	490	830
Silver Cloud	2	1.96	222	296	518
Silver Muse	1	2.47	411	596	1,007
Silver Spirit	1	0.69	376	540	916
Silver Wind	3	2.82	208	294	502
Star Breeze	2	1.05	164	208	372
Star Pride	1	0.57	164	208	372
The World	1	3.70	280	200	480
Variety Voyager Note 1	7	39.39	32	72	104
Viking Sky	1	0.65	550	930	1,480
Viking Sun	3	1.91	550	930	1,480
Zuiderdam	1	1.51	842	2,272	3,114

Notes:

1. The Variety Voyager was detained in Dublin Port between 27 July and 30 August 2018 (for approximately 35 days) (source: Paris MoU, www.parismou.org).

APPENDIX 4: INDIVIDUAL RISK CONTOURS

Appendix 4: Individual Risk Contours



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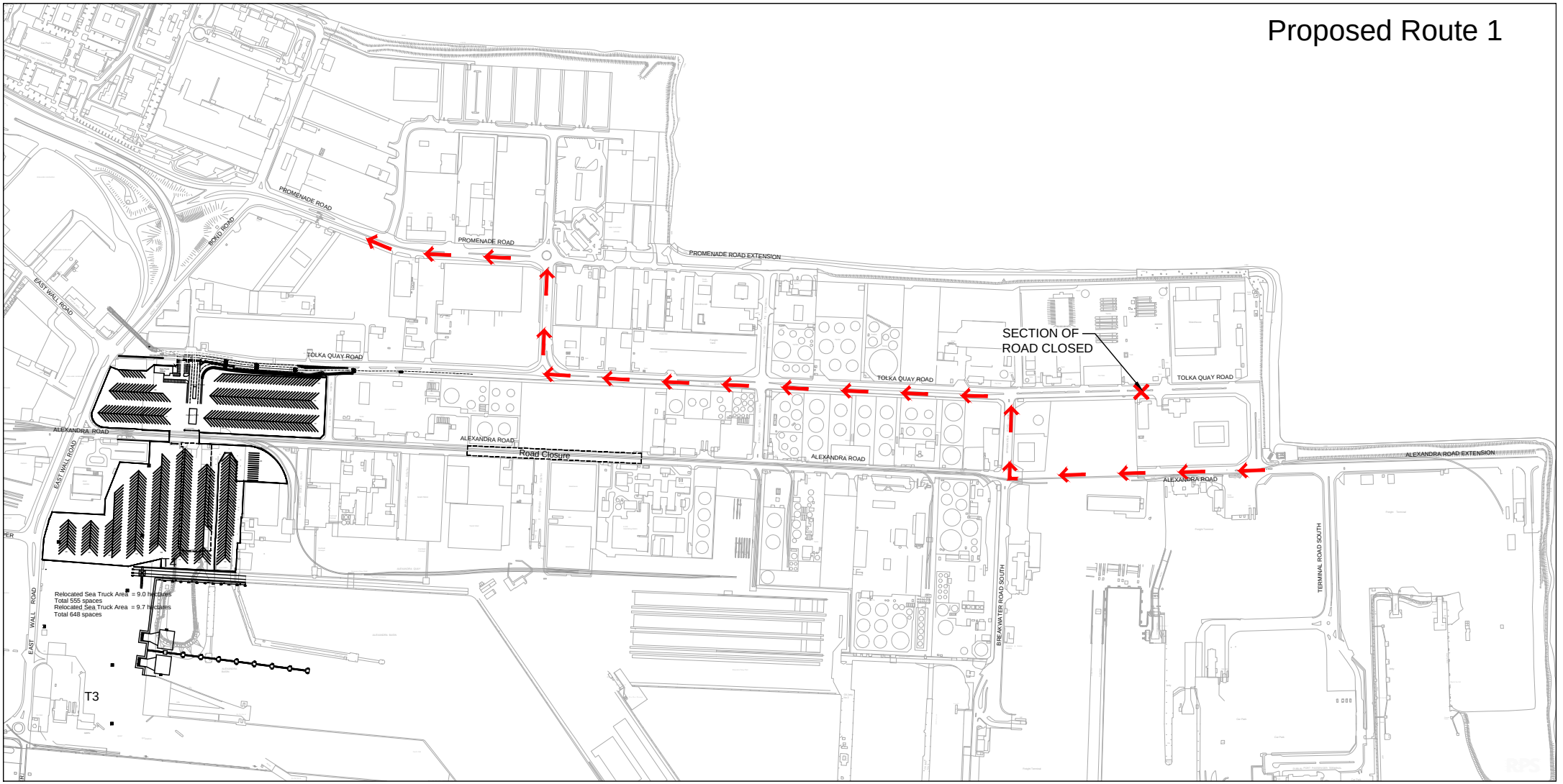
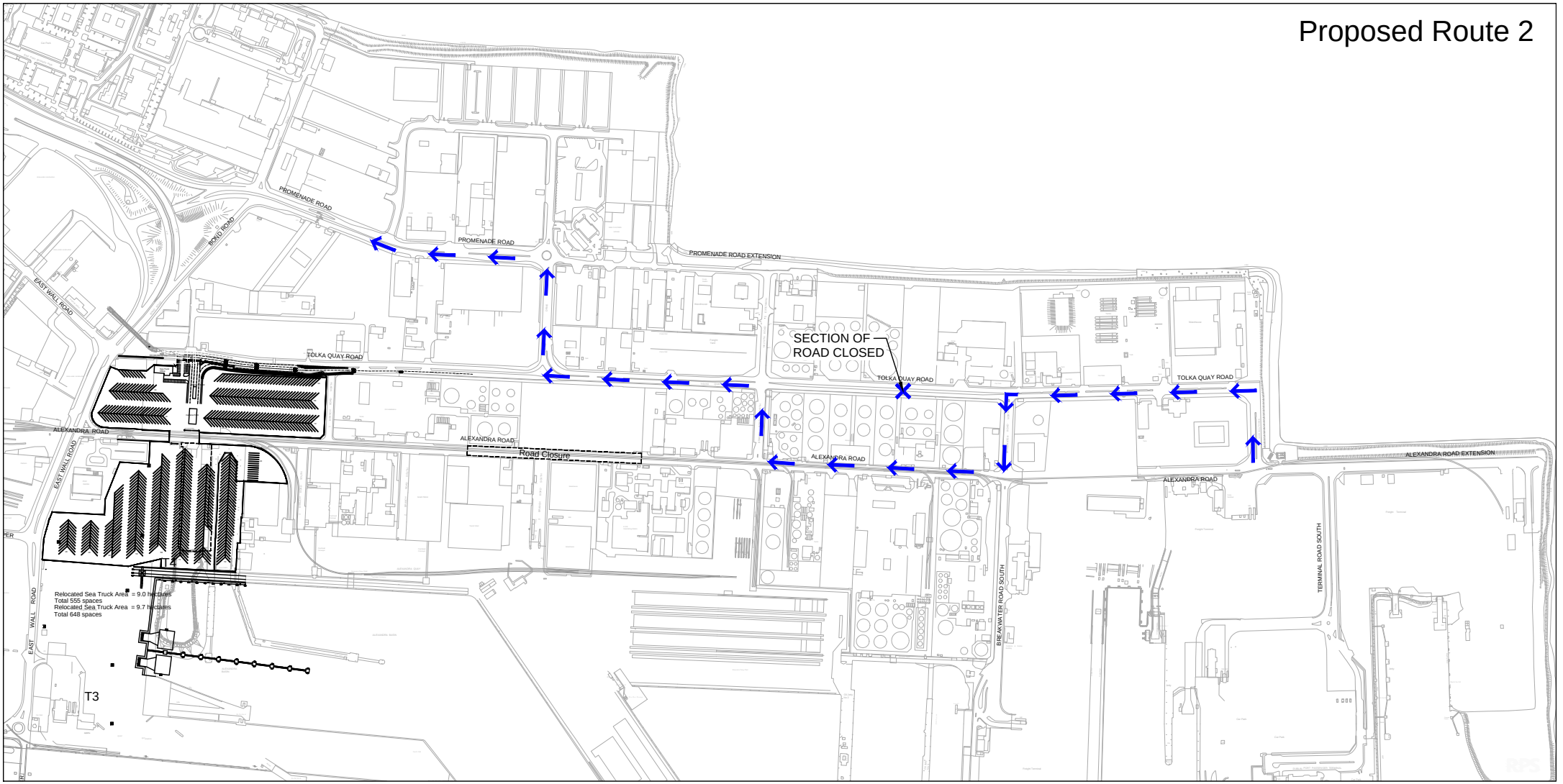
Client	RPS		
Project	COMAH Land Use Planning Assessment MP2 Project		
Title	Individual Risk Contours		
Scale	1:12,500	541-19X0055 A4	R0
FBS	541:14:03		

APPENDIX 5: DUBLIN PORT ACCESS & EGRESS ROUTES

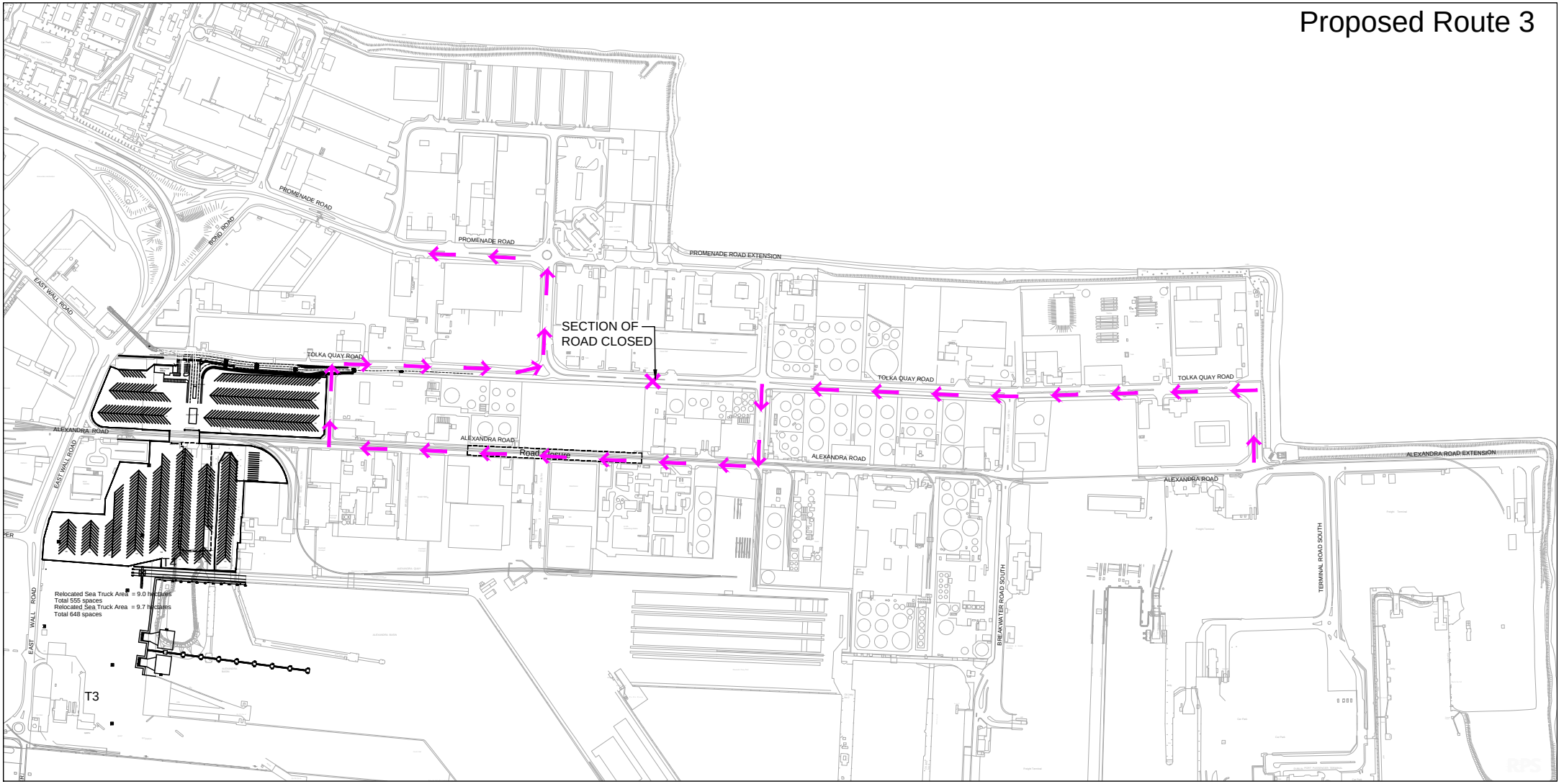
Appendix 5.1 Dublin Port Traffic Diversion Routes - Route 1



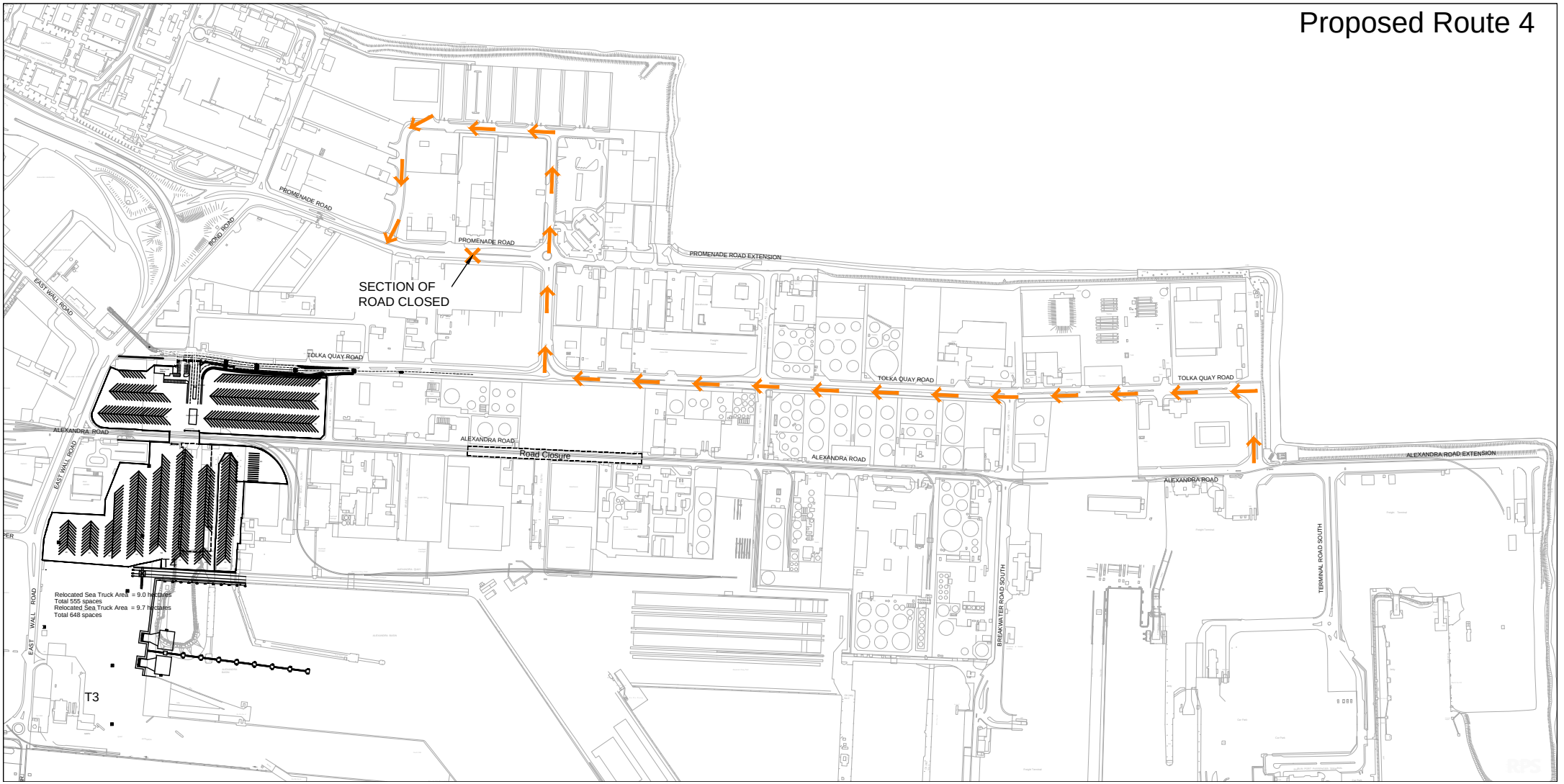
Appendix 5.2 Dublin Port Traffic Diversion Routes - Route 2



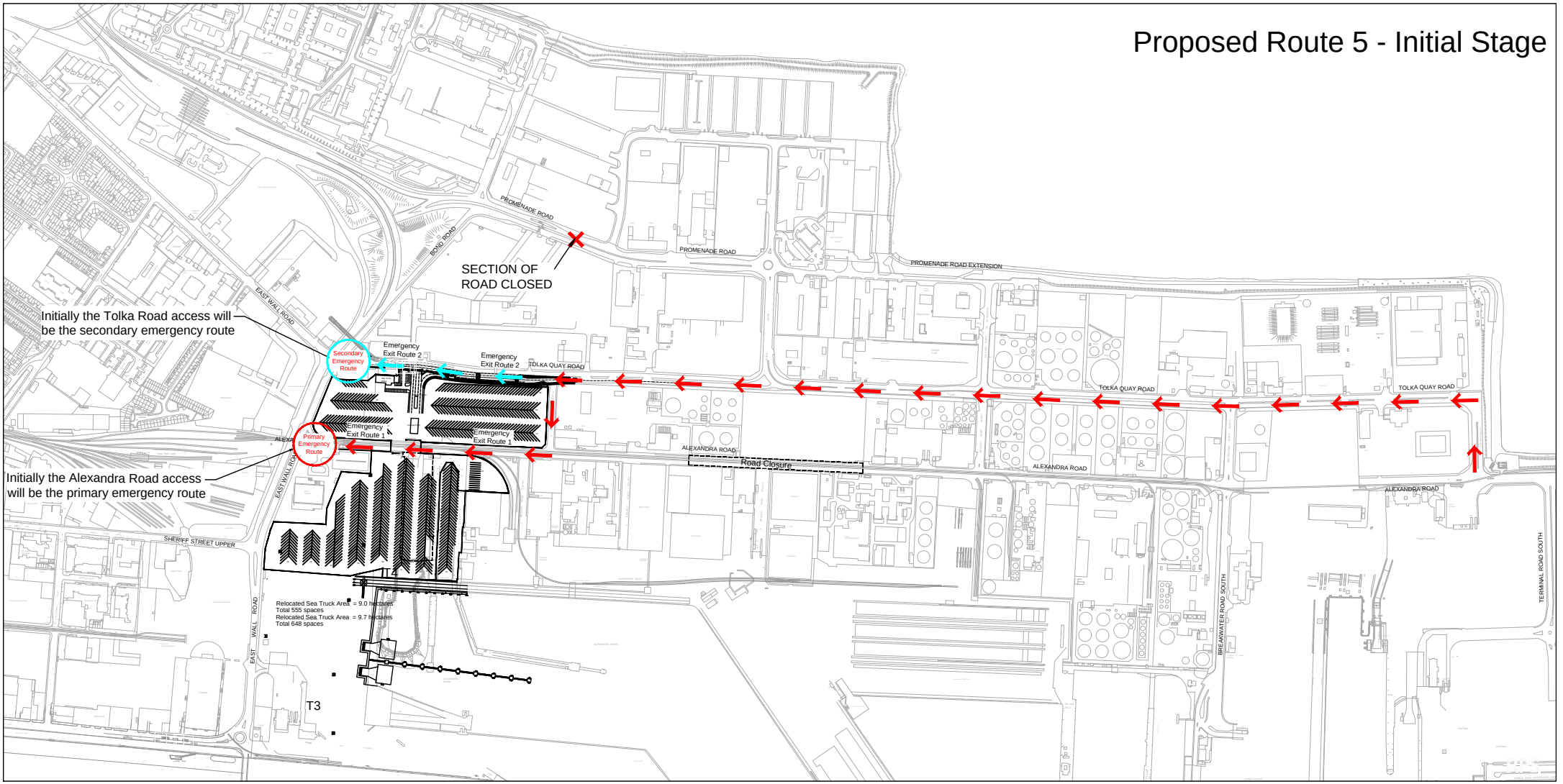
Appendix 5.3 Dublin Port Traffic Diversion Routes - Route 3



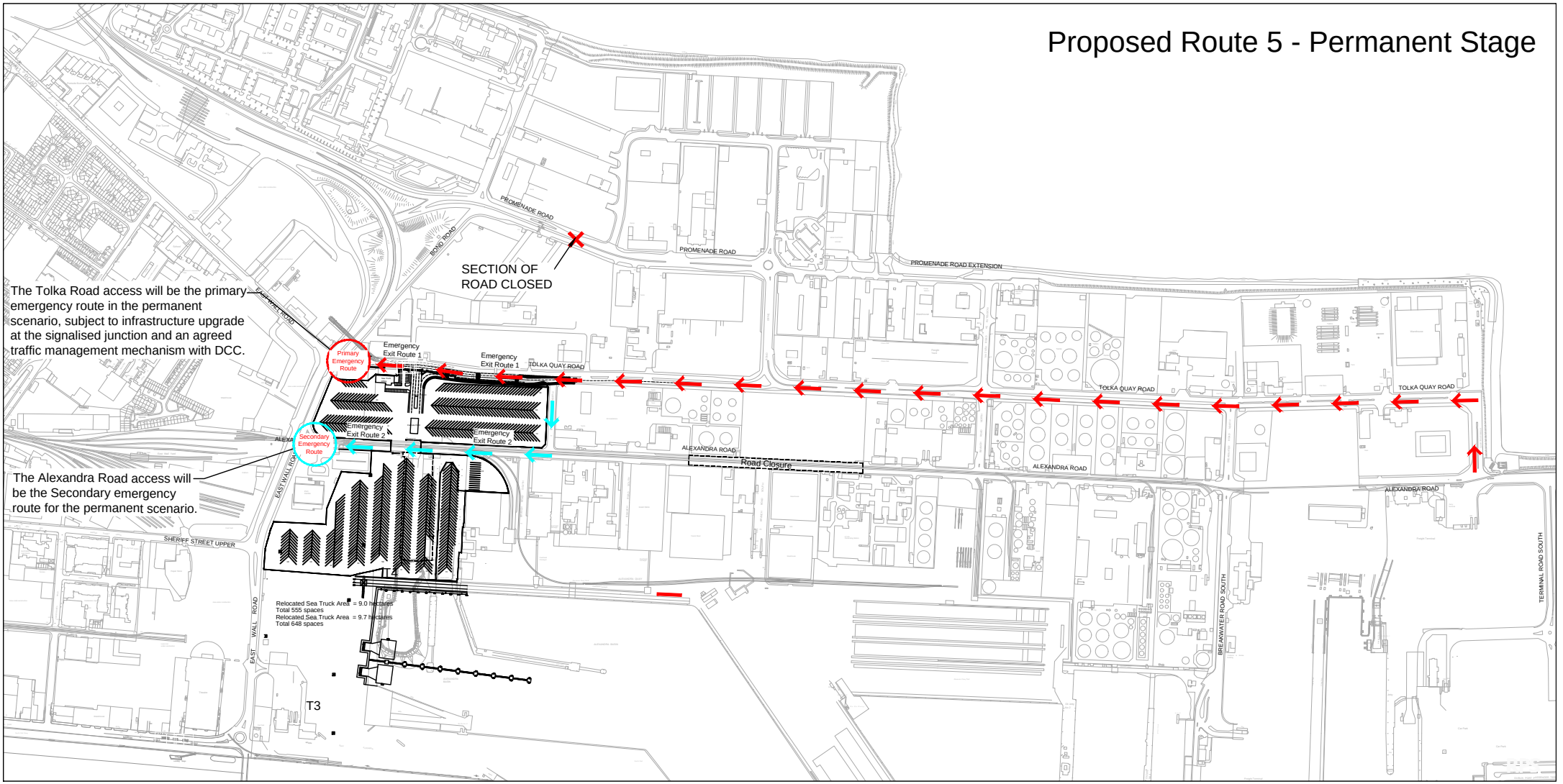
Appendix 5.4 Dublin Port Traffic Diversion Routes - Route 4



Appendix 5.5 Dublin Port Traffic Diversion Routes - Route 5 (initial)



Appendix 5.6 Dublin Port Traffic Diversion Routes - Route 5 (permanent)



APPENDIX 6: EXTRACTS FROM DUBLIN CITY DEVELOPMENT PLAN 2016 – 2022

9.5.10 Control of Major Accident Hazards Directive (SEVESO II Directive)

Directive 2012/18/EU was adopted taking into account, amongst other factors, the changes in EU legislation on the classification of chemicals and increased rights for citizens to access information and justice. This directive is known for convenience as the SEVESO III Directive.

Directive 2012/18/EU was transposed into Irish legislation through S.I. No. 209 of 2015 Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015.

S.I. No. 209 of 2015 came into effect on 1 June 2015.For clarity, the SEVESO III Directive replaced the SEVESO II Directive (96/82/EC).

One of the requirements of S.I. No. 209 of 2015 is that the Health and Safety Authority shall advise the relevant planning authority of a consultation distance for a SEVESO III establishment, following the receipt of a notification from the operator, and shall periodically review and update the consultation distance as necessary (see Appendix 12).

It is the Policy of Dublin City Council: SI28:
To have regard to the provisions of the Major Accidents Directive (2012/18/EU), relating to the control of major accident hazards involving dangerous substances and its objectives are to prevent major accidents and limit the consequences of such accidents. Dublin City Council will have regard to the provisions of the directive and recommendations of the HSA in the assessment of all planning applications located on or impacted by such sites.

APPENDIX 7: EXTRACTS FROM LEGISLATION

PLANNING AND DEVELOPMENT REGULATIONS 2001 (AS AMENDED)

Part 11 Major Accidents Directive

137 Notice to Health and Safety Authority

(1) In addition to the requirements of article 28 where—

(b) a planning authority receives a planning application relating to development which would—

(i) be of a category listed in Table 1 of Schedule 8, and

(ii) be located within the distance listed in column 2 of Table 2 of Schedule 8 from an establishment of the corresponding type listed in column 1 of Table 2, or be located within such distance from a particular establishment as has been specified by the Health and Safety Authority in technical advice provided under article 27 of the Major Accident Regulations,

and the Health and Safety Authority has not previously provided, either in relation to the development to which the application relates or on a generic basis, relevant technical advice on the risk or consequences of a major accident,

(c) a planning authority receives a planning application relating to development which would, in its opinion, be –

(i) in the vicinity of an establishment, and

(ii) relevant to the risk or consequences of a major accident,

and the Health and Safety Authority has not previously provided, either in relation to the development to which the application relates or on a generic basis, relevant technical advice on the risk or consequences of a major accident, the planning authority shall notify the Health and Safety Authority.

(3) A notice sent by a planning authority under sub-article (1) shall—

(c) where the planning application relates to development referred to in sub-article (1)(b) or (c), identify the relevant establishment or establishments,

(f) request a determination as to whether the Major Accidents Regulations apply to the proposed development, and

(g) request that, where the Authority determines under (f) above that the Major Accidents Regulations apply to the proposed development, technical advice on the effects of the proposed development on the risk or consequences of a major accident be provided to the planning authority.

Schedule 8 Table 1 Development Categories

1. Provision of hotel, hostel or holiday accommodation, or housing.
2. Provision of schools, crèches or other educational or childcare facilities, training centres, hospitals, convalescent homes, homes for the elderly or sheltered accommodation.
3. Retail developments greater than 250 square metres in gross floor space.
4. Structures for community and leisure facilities, greater than 100 square metres in gross floor space.
5. Provision of facilities or use of land for activities likely to attract more than 1,000 people at any one time.
6. Commercial or industrial development designed to accommodate 20 or more employees.
7. Provision of parking facilities for more than 200 motor vehicles.
8. Transport links, including public roads.
9. Any development adjoining, or separated only by a road from, an establishment and which poses a risk of fire or explosion.
10. Modifications to categories 2, 3, 4, 6 or 7 which would give rise to an increase in size or capacity of 20 per cent or more.

Schedule 8 Table 2 Distances from establishments

Column 1 Type of establishment	Column 2 Distance from establishment perimeter (metres)
Establishment where pressurised flammable substances (including liquefied petroleum gas) are stored in bulk –	
- above ground	600
- mounded/underground	
≤ 100 tonnes	100
> 100 tonnes	200
Establishment where pressurised or refrigerated to toxic substances (including ammonia) are present –	
- in bulk storage	2,000
- in cylinder or drum storage	700
Establishment consisting of or comprising a warehouse where chemicals are present.	700
Establishment where non-pressurised flammable substances are stored in bulk.	300
Establishment where chemical processing involving flammable or toxic substances takes place	1,000
Establishment where chemical processing, which involves the risk of dust explosion, takes place	300
Establishment where explosives are manufactured	1,000

CHEMICALS ACT (CONTROL OF MAJOR ACCIDENT HAZARDS INVOLVING DANGEROUS SUBSTANCES) REGULATIONS 2015

Part 7 Land-use Planning

24 Technical advice on land-use planning

(2) The Central Competent Authority shall provide technical advice in response to a notice sent by a planning authority under Part 11 of the Planning and Development Regulations 2001 (S.I. No. 600 of 2001), requesting technical advice on the effects of a proposed development on the risk or consequences of a major accident in relation to the following types of developments within the consultation distance notified in paragraph (1)—

> (c) new developments including transport routes, locations of public use and residential areas in the vicinity of establishments, where the siting, modifications or developments may be the source of, or increase the risk or consequences of, a major accident.

(3) The technical advice provided by the Central Competent Authority to a planning authority pursuant to paragraph (2) may be generic or case specific in nature and shall be so formulated that it will assist the planning authority to take into account the need, in the long term—

> (a) to maintain appropriate safety distances between establishments covered by these Regulations and residential areas, buildings and areas of public use, recreational areas, and, as far as possible, major transport routes;
>
> (c) for the operator to take additional technical measures, in the case of existing establishments, in accordance with Regulation 7, so as not to increase the risks to human health and the environment.

(9) The Central Competent Authority shall provide the technical advice referred to in paragraph (2) within four weeks of receiving a request from a planning authority.

(10) Without prejudice to paragraph (9), where the Central Competent Authority requires additional information in order to provide the requested technical advice to the planning authority under paragraph (2), the following shall apply—

> (a) the Central Competent Authority shall request the information from the planning authority within two weeks of the receipt of the request for technical advice;
>
> (b) the planning authority shall provide the additional information requested by the Central Competent Authority, if necessary after requesting it from the applicant;
>
> (c) the Central Competent Authority shall provide technical advice to the planning authority within four weeks of receiving the requested information.

(11) Operators of establishments shall provide sufficient information to the Central Competent Authority as part of the notification in Regulation 8 or an update under Regulation 12(2), and at any time at the request of the Central Competent Authority, on the risks arising from an establishment, necessary for the fulfilment of the Authority's functions under this Regulation, and in particular to ensure that technical advice on those risks for land-use planning purposes is available.