A National Risk Assessment for Ireland 2017

An Roinn Cosanta
Department of Defence

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Acknowledgements:

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SECTION 1. Introduction

1.1 Introduction

The White Paper on Defence (2015) sets out the Government's commitment to maintain, and further develop, a robust strategic emergency management framework. The production of this National Risk Assessment (NRA) 2017 for Ireland by the Government Task Force on Emergency Planning (GFT), is a constituent part of the adopted emergency management paradigm. In line with good practice, the aim is to repeat this NRA process at three yearly intervals so as to capture new and emerging threats and changing trends. This NRA forms a critical subset of the wider strategic level "National Risk Assessment: Overview of Strategic Risks" process undertaken by the Department of the Taoiseach on an annual basis. This separate annual process sets out a list of strategic risks, both financial and non-financial, which Ireland faces.

This NRA 2017 updates the previous NRA 2012, which was accepted by the European Commission as meeting the requirements of the Union Civil Protection Mechanism (UCPM). It incorporates a number of methodological changes which were designed to reflect current risk management standards and international good practice.

1.2 Why conduct a National Risk Assessment?

Hazard analysis and risk assessment are accepted internationally as essential steps in the process of identifying the challenges that may have to be addressed by society, particularly in the context of emergency management. This NRA, which was derived from inputs provided by experts across a wide range of sectors and disciplines:

- Underpins the Strategic Emergency Management (SEM): National Structures and Framework developed by the GTF;
- Contributes to creating a shared understanding of the national-level challenges to be addressed;
- Builds on the significant inter-agency work completed at the local and regional levels under the provisions of the "Framework for Major Emergency Management[1]";

[1] National Steering Group on Major Emergency Management; "A Framework for Major Emergency Management", 2006, available at: www.mem.ie

- Allows for the comparison and prioritisation of risks against pre-agreed criteria;
- Provides the basis for establishing priorities with regard to risk mitigation;
- Establishes the baseline for assessing national risk management capability;
- Ensures compliance with the EU Civil Protection Mechanism's[2] requirement to develop effective and coherent approaches to prevention of and preparedness for emergencies;
- Informs the development of enhanced national and community resilience.

[2] DECISION No 1313/2013/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 December 2013 on a Union Civil Protection Mechanism, available at: http://eur-lex.europa.eu/eli/dec/2013/1313/oj

SECTION 2. The National Context

2.1 The Population

Ireland's population has continued to grow over recent years - the population was 4,757,976 in 2016, representing an increase of almost 4% since the census of 2011. Approximately 20% of citizens are under 14 years old and 13% are over 65. Almost two thirds of the population live in an urban setting - with a particular concentration of population in the capital, Dublin (1.17 million in 2015).

2.2 Hazards and Vulnerabilities

Although Ireland has experienced a number of emergencies in the past, they have not been of the severity and scale of those witnessed by other countries. Ireland's geographic position means it is less vulnerable to natural disasters such as earthquakes and on-island volcanoes. However, in recent times there has been an increase in the number of severe weather events, particularly those leading to flooding and flash flood incidents. Severe weather poses one of the most common risks.

During the winter of 2015-2016 an exceptionally high level of rainfall was experienced across the country resulting in severe flooding in many regions. During the same period, a number of Atlantic Storms including Storms Desmond, Eva and Frank contributed to making it the wettest winter ever recorded - rainfall totals over the period were 189% of normal.

The Department of Housing, Planning, Community and Local Government led the response at a national level and provided a detailed Severe Weather Report[3] to Government in November 2016.

Ireland is a small peripheral net consumer of energy. As all oil and most gas must be sourced internationally, Ireland is vulnerable to energy crises resulting from geo-political events or natural disasters.

Serious transport accidents and disruption to transport networks and hubs have the potential to cause a national level emergency.

In common with all countries across the globe, Ireland is vulnerable to a wide range of human and animal diseases and public

[3] Available at: http://www.housing.gov.ie/community/fire-and-emergency-management/report-winter-flooding-dec-2015-jan-2016

health emergencies. Recent outbreaks, such as Ebola, Zika Virus and Pandemic Influenza were considered in the context of World Health Organisation (WHO) declarations that these outbreaks were "public health emergencies of international concern".

Major industrial accidents involving dangerous substances also pose a significant threat to people and the environment.

A fire and subsequent explosions that occurred at the Whiddy Oil Terminal, Bantry, Co. Cork in January 1979 remains one of Ireland's most deadly maritime/industrial disasters, with the loss of fifty lives.

Revised regulation, Chemicals Act (Control of Major Accident Hazards (COMAH) involving Dangerous Substances) Regulations 2015), came into force in Ireland in June 2015. These Regulations give effect to the European Union Directive 2012/18/EU -Seveso III[4].

They apply to sites where specified quantities of dangerous substances are stored. Ireland has a total of 91 COMAH sites (2016 figure).

A national or international Network and Information Security/Cyber incident has the potential to have a significant negative impact across many sectors of society. It is also clear that systemic risks to infrastructures exist as a consequence of their dependence on Information and Communications Technologies (ICTs), risks that are being mitigated by the Department of Communications, Climate Action and Environment through the National Cyber Security Centre, and the transposition of Directive (EU) 2016/1148, on the security of Network and Information Systems (the 'NIS Directive').

Other external factors, such as BREXIT, large scale emergencies or political crises in another jurisdiction can have cascading effects impacting on Ireland.

Finally, it is important to remember that certain risks are present by virtue of Ireland being an island nation. Ireland is dependent on sea and air transport for fuel, food, medicines etc.

This dependence could expose the country to a range of resource-based emergencies.

[4]Available at: http://ec.europa.eu/environment/seveso/

Also, because of our reliance on sea trade, a major maritime accident which compromised our shipping or ports could have a significant economic impact.

2.3 Risk Mitigation and Control

Mitigation as a risk treatment process involves reducing or eliminating the likelihood and/or the impact of an identified hazard.

Legislative controls are in place in relation to a number of significant hazards. These legal controls are enforced by regulatory authorities or agencies overseen by the relevant Lead Government Department (LGD).

Decisions regarding prioritising and resourcing of appropriate mitigation measures are the responsibility of the LGD and/or relevant bodies under its aegis. This process should inform the allocation of additional resources, if necessary, at all levels up to central Government funding.

Progress on mitigation, i.e. risk reduction, is monitored and reported internally by each LGD. The Minister with responsibility for Defence as Chair of the GTF, also brings a confidential Annual Report to Government regarding emergency planning.

2.4 Community Resilience

Strong community resilience is a key feature of Irish life and culture. Community resilience is the sustained ability of a community to mobilise available resources to respond to, cope with, and then recover from adverse situations, such as emergencies. Resilient communities minimise disruption caused by an emergency to everyday life and their local economies. Resilient communities are not only prepared to help prevent or minimise the loss or damage to life, property and the environment, that can arise from an emergency, but they also have the ability to quickly return citizens to work and everyday life, reopen businesses, and restore the community as a whole to normality. A resilient community will therefore suffer less both during and after an emergency.

SECTION 3. Emergency Management in Ireland

3.1 National Structures

The national structures and arrangements are as set out in the SEM. These structures are in place to enable the delivery of national-level emergency management, including risk assessment, in Ireland.

3.2 Government Task Force on Emergency Planning

The GTF is chaired by the Minister with responsibility for Defence and comprises senior representatives of all Departments, the Health Service Executive, An Garda Síochána, the Defence Forces, the Health and Safety Authority, the Revenue Commissioners, Met Éireann, the Environmental Protection Agency, the Office of the Government Chief Information Officer, Civil Defence, the Office of Public Works, the Irish Coast Guard and other Agencies as appropriate. Ministers may also attend the GTF when appropriate.

The GTF, which is supported by the OEP, coordinates and oversees the emergency management policy and activities of all Government Departments and Agencies under their aegis.

The GTF provides political leadership and facilitates coordination of emergency management between Departments and Agencies on an ongoing basis. The GTF provides support for the policy initiatives of the Chair of the GTF, usually through specially tasked GTF Sub-Groups. It also provides a platform for the sharing of experience and best practices across Departments and Agencies.

3.3 Government Task Force Sub-Groups

The GTF Sub-Groups are formed for specific purposes and can consist of representatives from Government Departments, Agencies and Public or Semi-State Authorities with lead or support roles in Government emergency plans as well as private stakeholders and non-governmental organisations as required. The GTF Sub-Group on Risk is comprised of members of the GTF and its work on the NRA is supported by the OEP and the DCU Business School.

The GTF charges these Sub-Groups with carrying out specific studies and developing particular aspects of emergency management. The GTF Sub-Groups address emergency management matters with a view to minimising the potential consequences of any given emergency and report to the GTF as required.

3.4 Lead Government Departments

Each Lead Government Department (LGD) has the mandate and responsibility to coordinate all national level activity for its assigned emergency types. The LGD role includes risk assessment, planning and preparedness, prevention, mitigation, response, and recovery. Annex A of the SEM sets out the LGD for each emergency type identified. Support Department and Agency responsibilities are also assigned**.**

3.5 Support Government Departments and Agencies

All Government Departments and the Agencies under their aegis will be prepared to act in a principal support[5] or other support role[6]. The LGD identifies the specific roles which it expects Support Departments/Agencies to undertake in an emergency, and works with them in the planning and preparedness phase**.**

3.6 National Emergency Coordination Group

The National Emergency Coordination Group (NECG) is the central Government platform established as part of the response to a threatened or ongoing national-level emergency. It is convened by the OEP at the request of the relevant LGD, and is chaired by the Minister or a senior official of that Department. When an NECG is convened, all members of the GTF are obliged to attend the first meeting. Attendance at subsequent meetings is managed in the light of the nature of the emergency, and at the discretion of the LGD.

The Chair of the NECG may establish Sub-Groups to deal with specific issues which arise, or are expected to arise in dealing with an emergency.

[5] A Principal Support Role is one that is explicitly mentioned in a Department's emergency plans.

[6] Other support roles include non-specific assistance, which may be requested from any Department or Agency in an emergency.

3.7 The Office of Emergency Planning

The OEP, established within the Department of Defence, supports the Minister with responsibility for Defence as Chair of the GTF. The OEP manages and operates the National Emergency Coordination Centre (NECC), maintaining the facility in a high state of readiness and facilitating its use by the LGDs in the conduct of emergency response and other emergency management-related activities. The OEP provides peer support to Government Departments and Agencies in identifying capability gaps and informing capability development.

The OEP acts as a focal point in matters of emergency planning and risk assessment specifically and emergency management generally. Furthermore, its remit extends to the arrangement of training and education relating to emergency management, and offering advice and assistance if requested to Government Departments in relation to their emergency management functions. The OEP has the objective of improving and coordinating emergency planning and bringing the necessary cohesion to the emergency management-related work of the various Departments and Agencies.

The OEP also acts as a resource for Departments and Agencies, offering advice and assistance in preparing emergency plans, preparing and conducting exercises and assisting those who respond to emergency events at national level.

The OEP, with academic support from the DCU Business School, prepares the NRA for adoption by the GTF and for Government approval. Once approved, the NRA is submitted to the EU and subsequently published.

3.8 National Security Committee

The National Security Committee (NSC) is chaired by the Secretary General to the Government. The NSC comprises senior representatives of the Departments of the Taoiseach, Justice and Equality, Defence, Foreign Affairs and Trade, together with the Defence Forces and An Garda Síochána. The Committee's main remit is security but it is available as a high level resource during an emergency in which there is a security dimension.

3.9 Framework for Major Emergency Management (MEM)

The National Steering Group on Major Emergency Management is chaired by the National Directorate for Fire and Emergency Management in the Department of Housing, Planning, Community and Local Government. The MEM Framework[7] sets out the arrangements to enable the Principal Response Agencies (PRAs - Local Authorities, the Health Service Executive, and An Garda Síochána) to prepare for and provide a coordinated response to major emergencies. An extensive range of appendices and other guidance documents and protocols dealing with specific aspects of emergency management complement the MEM Framework. Both the SEM and the MEM Frameworks adopt an all hazards approach to emergency management, which advocates a systems approach based around a five-stage emergency management paradigm, as illustrated in Figure 1.

Figure 1: Five-Stage Emergency Management Paradigm

In conjunction with the relevant guidance documents, the MEM Framework details how a structured hazard analysis and risk assessment must be completed initially by the PRAs and then by regional, multi-agency teams in each of the eight designated MEM regions within the country. As well as setting out how the PRAs work together, the MEM Framework also identifies how these plans link with other National Plans and with site or event specific local emergency plans (See Figure 2 below - Linking National Plans, MEM Plans and other Plans).

[7] Available at: www.mem.ie

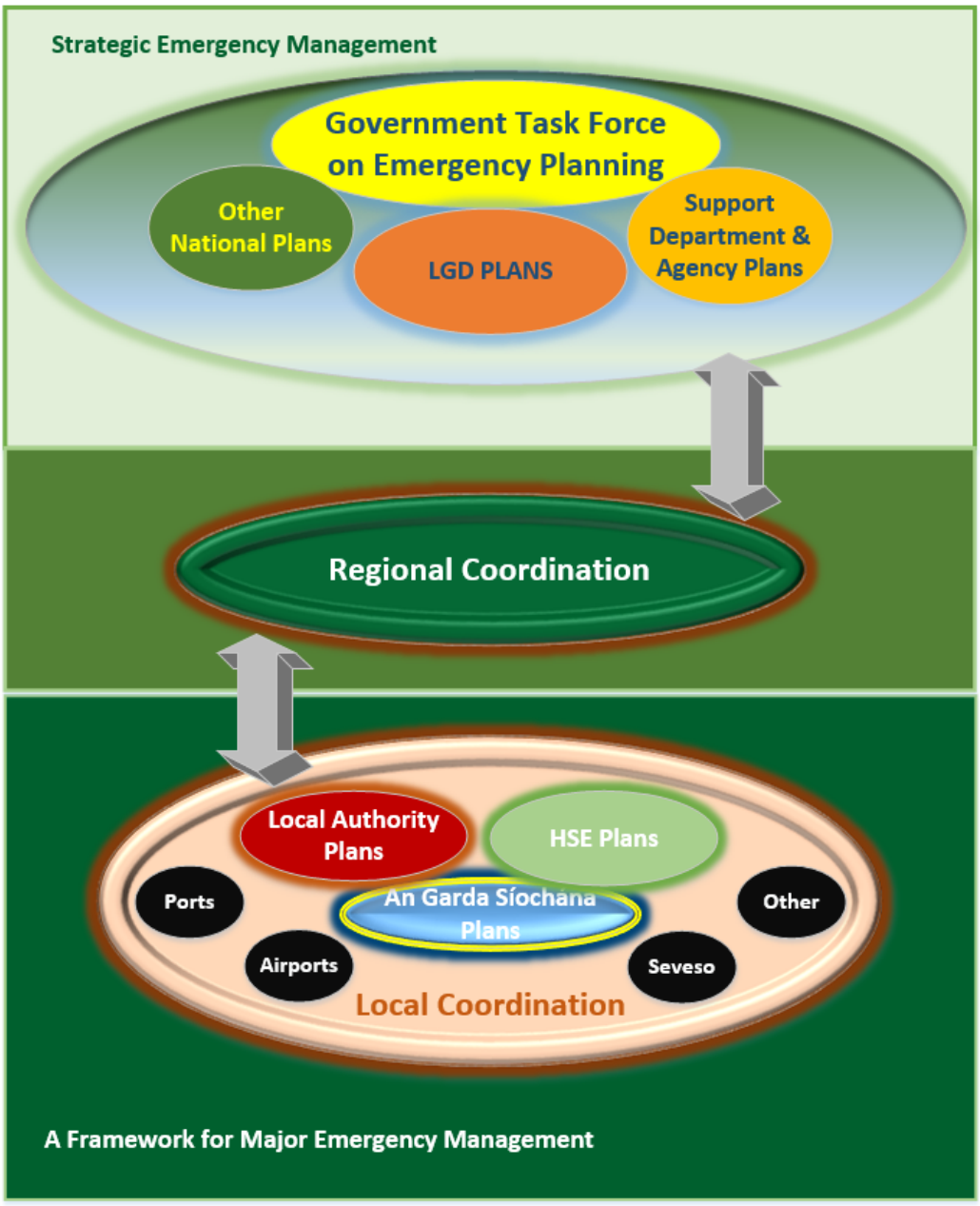

Figure 2: Linking National Plans, MEM Plans and other Plans

SECTION 4. The Process and Methodology

4.1 Risk Definitions

This NRA was prepared in accordance with the SEM risk management definitions.

Risk: The combination of the likelihood of a hazardous event and its potential impact.

Hazard: Any phenomenon with the potential to cause direct harm to members of the community, the environment or the physical infrastructure, or being potentially damaging to the economic and social infrastructure

Likelihood: A probability (of the hazard occurring) or a frequency, whichever is appropriate for the analysis under consideration. In this process, assessment of likelihood is made using Average Recurrence Interval (ARI) -"a statistical estimate of the average period of time (usually in years) between occurrences of an event of given scale."
(Australian Government Attorney-General's Department 2015, p.70)

Impact: The consequences of a hazardous event actually happening, expressed in terms of a negative impact on human welfare, economic activity, environmental welfare or societal structures.

Risk Treatment. A process to modify risk (ISO 31000: 2009[8]). Risk treatment processes that address negative consequences are referred to as 'Risk Mitigation'.

[8] ISO 31000:2009 provides principles and generic guidelines on risk management, available at: http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=43170

4.2 The National Risk Assessment Process and Methodology

The National Risk Assessment process consists of the following key stages, as illustrated in Figure 3 below.

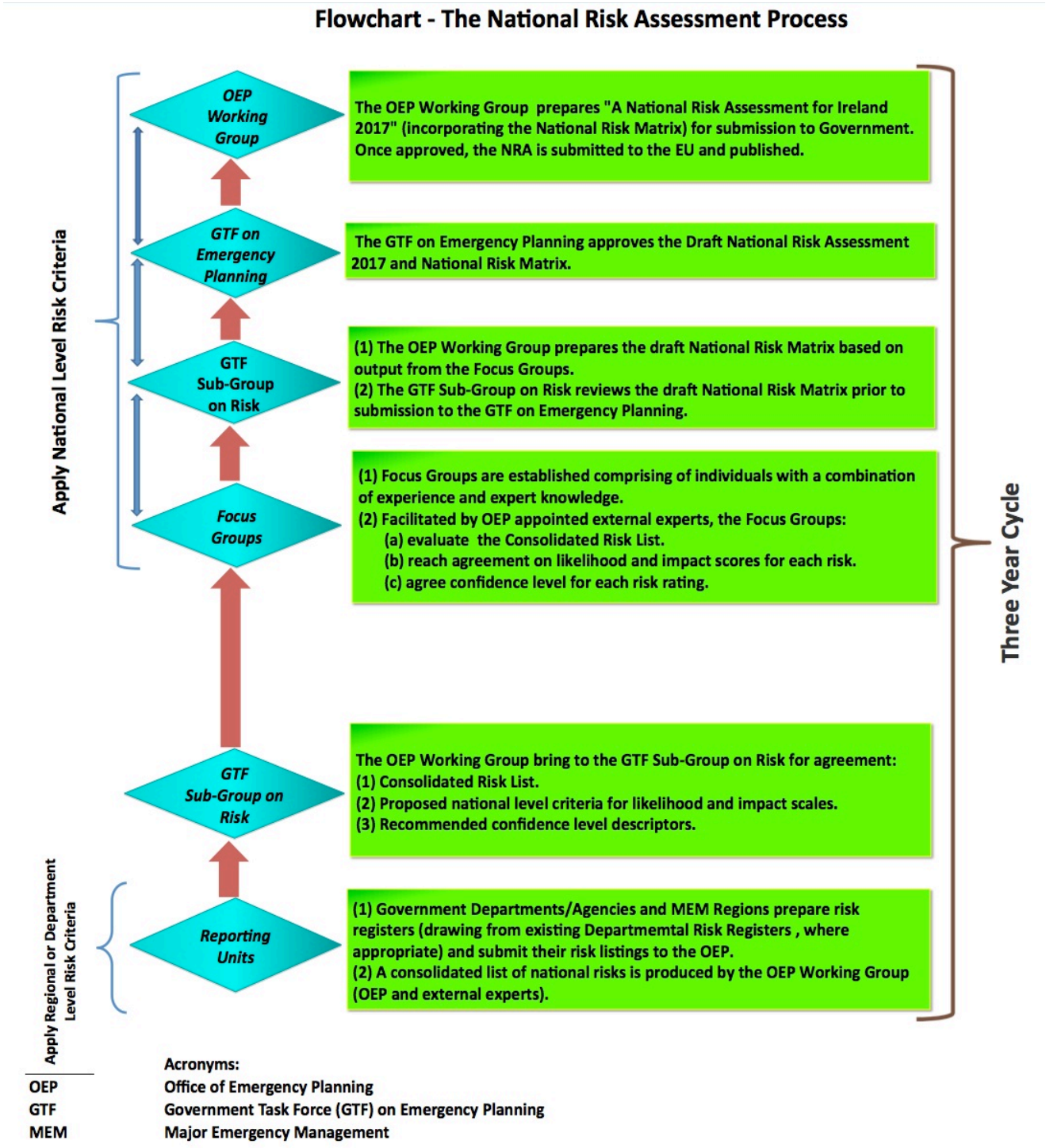

Figure 3: NRA Process Flowchart

Stage 1: All Government Departments and their Agencies (where appropriate) submitted to the OEP a listing of hazards which, in their expert view, had the potential to trigger a national emergency.

In addition, Regional Major Emergency Risk Registers, prepared by the Principal Response Agencies (PRAs) under the 'Framework for Emergency Management', were provided via the National Directorate for Fire and Emergency Management.

The hazards listings and risk registers submitted were reviewed by the OEP and the DCU Business School Project Team. Taking account of the various inputs, identifying duplicated or overlapping hazards, and eliminating those better described as consequences, a consolidated list of hazards with the potential to trigger a national emergency was prepared.

Stage 2: The consolidated hazard listing was grouped in accordance with the SEM, into four categories:

- Natural
- Transportation
- Technological
- Civil

This was approved by the GTF Sub-Group on Risk (See Table 1 below). The GTF Sub-Group also approved the revised criteria (scales) for assessing the **Likelihood** and **Impact** of each hazard.

The 2012 criteria were revised to reflect international good practice and to allow for scalability within the People and Finance Impact Categories. An additional feature of the 2017 NRA was the introduction of Confidence Level Descriptors designed to capture the level of uncertainty present in the risk assessment.

This NRA, where appropriate, is supported by quantitative analysis where relevant data is available to support such analysis.

The development of this element of the NRA, the output of which is documented in Section 5 – National Risk Matrix and Risk Narratives, was coordinated through the GTF Sub-Group on Risk by the OEP, with guidance and academic oversight from the DCU Business School team.

Table 1 – Consolidated List of National Hazards

Hazard: Civil	**Hazard: Natural**
• Infectious Disease • Terrorist Incident • Animal Disease • Foodborne Outbreaks • Waterborne Outbreaks • Crowd Safety • Civil Disorder • Loss of Critical Infrastructure	• Storm • Flooding • Snow • Low temperatures • High temperatures • Volcanic Ash • Drought • Tsunami • Space Weather
Hazard: Transportation	**Hazard: Technological**
• Road • Rail • Air • Maritime • Transport Hub	• Industrial Incident • Hazmat • Fire • Nuclear Incident (Abroad) • Radiation Incident (Domestic) • Disruption to electricity/gas supply • Disruption to oil supply • Network and Information Security/Cyber Incident

Stage 3: Involved consideration of the hazard listing and assessment of the associated risks by Focus Groups facilitated by the DCU Business School team. Membership of the focus groups comprised experts drawn from the relevant Government Departments, State Agencies and Academia. Prior to attending, each participant consulted with their colleagues to gather data and expert opinion relevant to the identified hazards. Each focus group completed:

1. An assessment of the likelihood (probability) of the hazard occurring.
2. An examination of the potential severity of impact on people, the environment, the economy and society. Impact was assessed on the basis of the "reasonable worst case scenario".

It is important to note that "the probability relevant to the selected consequence is used and not the probability of the event as a whole" (BS EN 31010: 2010, p.85).

The impact and likelihood criteria, outlined in Tables 2 and 3 below, were used as the basis for decision making with respect to the relative risk of each identified hazard. All assessments were made taking account of the mitigation measures already in place.

The confidence level, as outlined in Table 4 below, associated with each assessment was also agreed and recorded. Where a confidence level was determined as low due to a lack of reliable data and/or unavailability of input from appropriate experts, further hazard specific Focus Groups were convened to address these deficits.

In line with EU guidance[9], particular consideration was given to the potential impact of climate change and the interdependent nature of elements of critical infrastructure - the domino and/or cascading effect.

Stage 4: Following an analysis of the results from each of the Focus Groups, the OEP and DCU Business School Project Team, plotted each hazard on a category-specific risk matrix, noting the confidence level for each assessment. This was then used to produce a consolidated overall National Risk Matrix and a short narrative capturing qualitative data from the Focus Groups.

Stages 5 and 6: are concerned with the approval of the "National Risk Assessment for Ireland (2017)" by the GTF and its subsequent submission to Government.

[9] DECISION No 1313/2013/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 December 2013 on a Union Civil Protection Mechanism, available at: http://eur-lex.europa.eu/eli/dec/2013/1313/oj)

Table 2: Classification of National Likelihood Criteria

National Likelihood Criteria		
Rating	**Classification**	**Average Recurrence Interval**
1	**Extremely Unlikely**	**500 or more years between occurrences**
2	**Very Unlikely**	**100 - 500 years between occurrences**
3	**Unlikely**	**10 - 100 years between occurrences**
4	**Likely**	**1 - 10 years between occurrences**
5	**Very Likely**	**Less than one year between occurrences**

Table 3: Classification of National Impact Criteria

National Impact Criteria					
	Very Low	**Low**	**Moderate**	**High**	**Very High**
People[10]	Deaths less than 1 in 250,000 people for population OR Critical injuries/illness less than 1 in 250,000 OR Serious injuries less than 1 in 100,000 OR Minor injuries only	Deaths greater than 1 in 250,000 people for population OR Critical injuries/illness greater than 1 in 250,000 OR Serious injuries greater than 1 in 100,000	Deaths greater than 1 in 100,000 people for population OR Critical injuries/illness greater than 1 in 100,000 OR Serious injuries greater than 1 in 40,000	Deaths greater than 1 in 40,000 people for population OR Critical injuries/illness greater than 1 in 40,000 OR Serious injuries greater than 1 in 20,000	Deaths greater than 1 in 20,000 people for population OR Critical injuries/illness greater than 1 in 20,000
Environment[11]	Simple, localised contamination.	Simple, regional contamination, effects of short duration	Heavy contamination localised effects or extended duration	Heavy contamination, widespread effects or extended duration.	Very heavy contamination, widespread effects of extended duration
Economic[12]	Up to 1% of Government Annual Budget	Greater than 1% of Government Annual Budget	Greater than 2% of Government Annual Budget	Greater than 4% of Government Annual Budget	Greater than 8% of Government Annual Budget
Social[13]	Limited disruption to community	Community functioning with considerable inconvenience	Community functioning poorly	Community only partially functioning	Community unable to function without significant support

[10] Injury or illness levels are determined by the extent of medical treatment required. Critical injuries pose an immediate threat to life. Serious injuries require significant medical care but are not expected to progress to life threatening status. Minor injuries require basic medical aid.

[11] Environmental criteria are based on the EPA Environmental Impact Assessment Criteria - https://www.epa.ie/pubs/advice/licensee/Guidance%20to%20licensees.pdf.

[12] Includes financial and economic costs associated with an emergency. Research indicates there is no universally accepted approach to expressing economic impact on the State. Commonly used metrics include Percentages (%) of Government Annual Budget, Gross Domestic Product (GDP), Gross National Income (GNI) or Gross National Product (GNP). In selecting the approach for Ireland's NRA, consideration was given to international practice, consultation with Government Departments and EU guidance, e.g. the EU solidarity Fund threshold. Percentage (%) of Government Annual Budget was adopted as the most suitable "Proxy" for economic impact.

[13] Consideration was given to the impact on: Infrastructure; Community Services; Utilities; Evacuation/Quarantine; Property/Housing; Supplies of Food, Water, Medicines; Civil Unrest; and Public Dissatisfaction. The focus is on the community as a whole rather than impact on the individual (already assessed under the "People" criteria).

Table 4: National Confidence Level Descriptors

National Confidence Level Descriptors[14]	
Confidence Level	**Criteria**
High * **	**Assessment based on expert knowledge of the issue and/or reliable, relevant, current data. Consistent agreement among assessors.**
**Moderate ** **	**Assessment informed by significant knowledge of the issue and/or limited reliable, relevant, current data. Broad agreement among assessors.**
**Low * **	**Assessment informed by limited knowledge of the issue and/or insufficient reliable, relevant, current data. Limited agreement among assessors.**

[14] The National Confidence Level Descriptors capture the reliability, relevance and currency of the evidence used to support the likelihood and impact assessments. They are also an indicator of the level of agreement between experts that attended the Focus Groups. Assessment of confidence levels helps to determine if there is a need for a more detailed risk assessment with specific subject matter experts. The Confidence Levels are also recorded on the National Risk Matrix for each risk.

SECTION 5. National Risk Assessment

The aim of this NRA process is to determine the key national risks which require "a higher level of management" and to determine which risks "need not be considered further at this time" (BS EN 31010:2010 p.83).

The risk matrix for each category of hazard (natural, transportation, technological and civil), as well as a summary of the rationale underpinning each individual assessment, are presented in Sections 5.1 to 5.4 below.

Following the risk assessment process

1. Risks rated as extremely or very unlikely and being of moderate impact or less and
2. Risks rated as low or very low impact and which are considered to be unlikely to occur

are not plotted on the 2017 National Risk Matrix.

5.1 Natural Hazards

Severe weather related emergencies dominate the natural hazard classification.

The national meteorological service, Met Éireann, provides advance notice of severe weather, usually several days in advance. When appropriate, colour-coded weather warnings are issued. Where appropriate these warnings trigger the convening of the NECG. The NECG coordinates the preparation and response required of departments, state agencies, local authorities, industry and citizens.

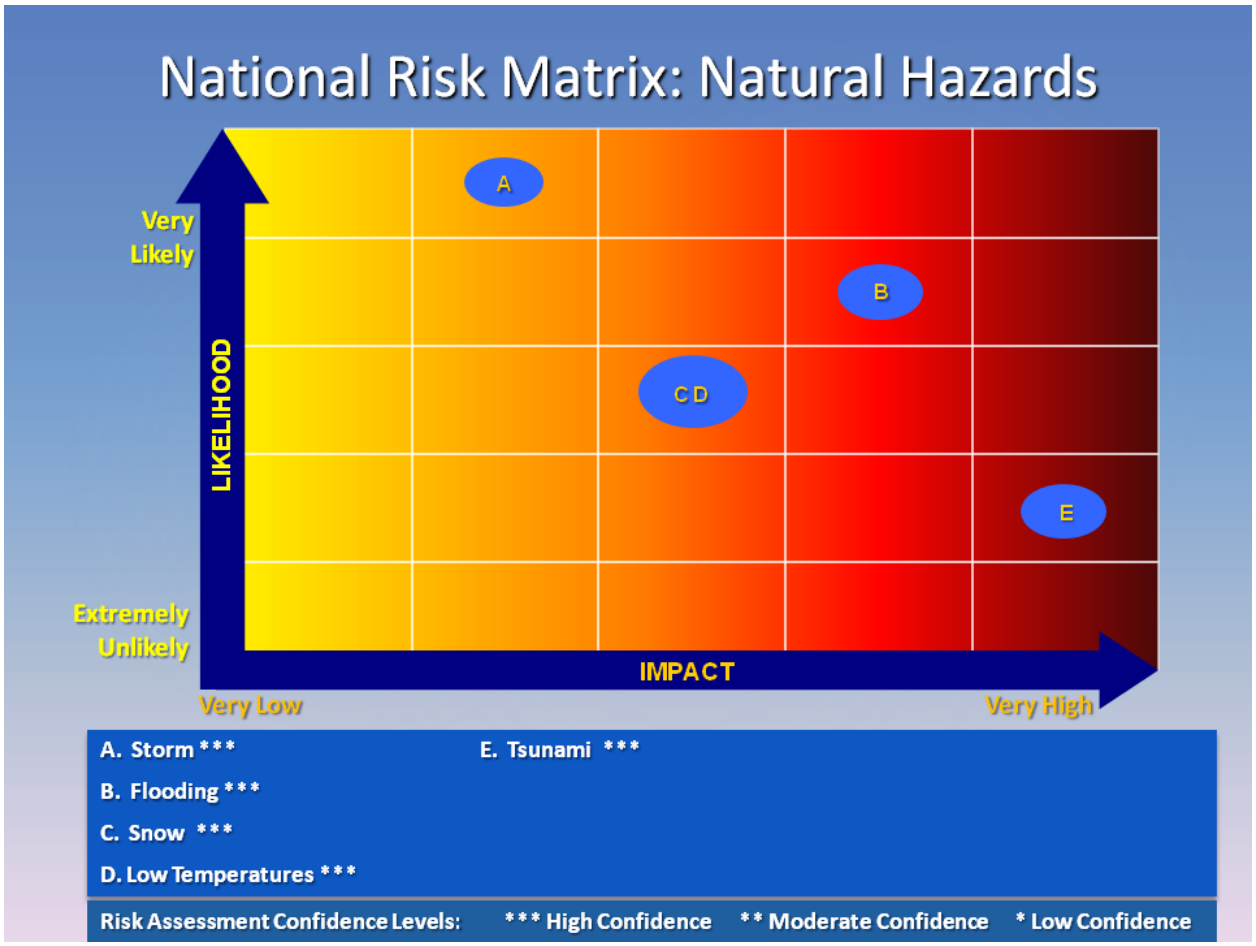

Figure 4: Natural Risk Matrix

5.1.1 Snow/Low Temperatures

Due to the dominant influence of the Atlantic Ocean, Ireland does not usually suffer the extremes of temperature experienced by other countries at similar latitude. Ireland has, however, experienced periods of such severe weather – most recently in 2010 and previously 1982, 1978/79, 1962/63 and 1947. On average such severe winters are experienced once every ten years.

Robust plans are in place to deal with severe weather emergencies at local, regional and national levels. In addition, an annual campaign to build national resilience, the "Be Winter Ready" initiative was launched in 2011.

The aim is to encourage individuals and communities to prepare for severe weather and to plan for mitigating the impact. This has helped to lessen the impact of snow and low temperature events.

There have been no significant snowfalls or periods of prolonged low temperatures since the last NRA process was completed in 2012.

5.1.2 Storm

Storms occur when mean wind speeds exceed 65 km/h and gust speeds are in excess of 110 km/h. Such events are experienced in Ireland typically four or five times each year, with the west and northwest of the country most often impacted[15]. The impact of storms is normally experienced at local or regional level. More significant national impact is experienced when higher wind speeds occur or when the area impacted is more densely populated. Exceptionally stormy periods have been registered, such as the winter of 2013/14, and the winter of 2015/16 during which eleven storms impacted either Ireland or Britain.

The reasonable worst case scenario adopted was a storm equal to the magnitude of Storm Darwin in February 2014. Storms of this impact are typically experienced once every two or three decades[16]. Storms are usually forecast three or four days in advance, allowing mitigating actions to be taken, but damage to infrastructure (buildings, power lines) and disruption to transport is usually unavoidable. Along with damage caused directly by the strong winds, storms can give rise to considerable damage in coastal regions caused by high waves, or by sea surge leading to flooding.

5.1.3 Flooding

Ireland has experienced a number of significant flooding events in recent years. These floods have an impact on people, the environment, the economy and the social fabric and infrastructure of society. Since 2012, when flooding was rated one of the most significant national level risks, additional flood mitigation schemes are implemented on an ongoing, prioritised basis. Funding of 430 million euro has been allocated to Flood Risk Management in the Capital Investment Plan 2016-2021.

[15] See text and graphics available at: http://www.met.ie/climate-ireland/wind.asp

[16] See full description available at: http://www.met.ie/climate-ireland/weather-events/2014StormDarwin.pdf

In addition, the PRAs, under the guidance of the National Steering Group for Major Emergency Management, have facilitated an enhanced preparation and response capability. Notwithstanding these arrangements, significant impacts of flooding have been experienced across the country, particularly from December 2015 to January 2016.

5.1.4 Tsunami

Historical records and geological evidence indicate that, while tsunamis are unlikely events around Ireland, the Irish coast is vulnerable to tsunamis from submarine landslides and distant earthquakes. Levels of coastal flooding would be similar to that seen during storm surges, but with much more energetic inundation and a much shorter time to react.

An international tsunami detection and alerting system is in place and has been tested a number of times. Ireland receives tsunami messages from the French Centre National d'Alerte Aux Tsunamis (CENALT), but there is no national system to convert these messages to warnings if required. Geological Survey Ireland is working with national partners, including the OEP, Met Éireann, Dublin Institute for Advanced Studies and the Marine Institute and others, to develop an appropriate emergency response plan. The absence of a 24/7 national warning system was considered as part of this risk assessment.

5.1.5 Other Natural Hazards

In 2012 a total of seven natural hazards were included on the national risk matrix. Following the 2017 risk assessment process, three of these risks, drought, volcanic ash and high temperatures, were considered to have a risk rating below the threshold for inclusion. An additional natural hazard, space weather, also fell below the threshold for inclusion. These risks will remain under review by the relevant LGD and/or National Agency.

5.2 Transportation Hazards

Road traffic accidents, such as bus crashes and multiple vehicle collisions, tend to impact at a local or regional level. Transport incidents, having national impact, are rare. There have, however, been rail, maritime and aviation incidents which have triggered national level responses – examples include the Buttevant Rail Crash (1980) and the Air India disaster off the Coast of Kerry (1985).

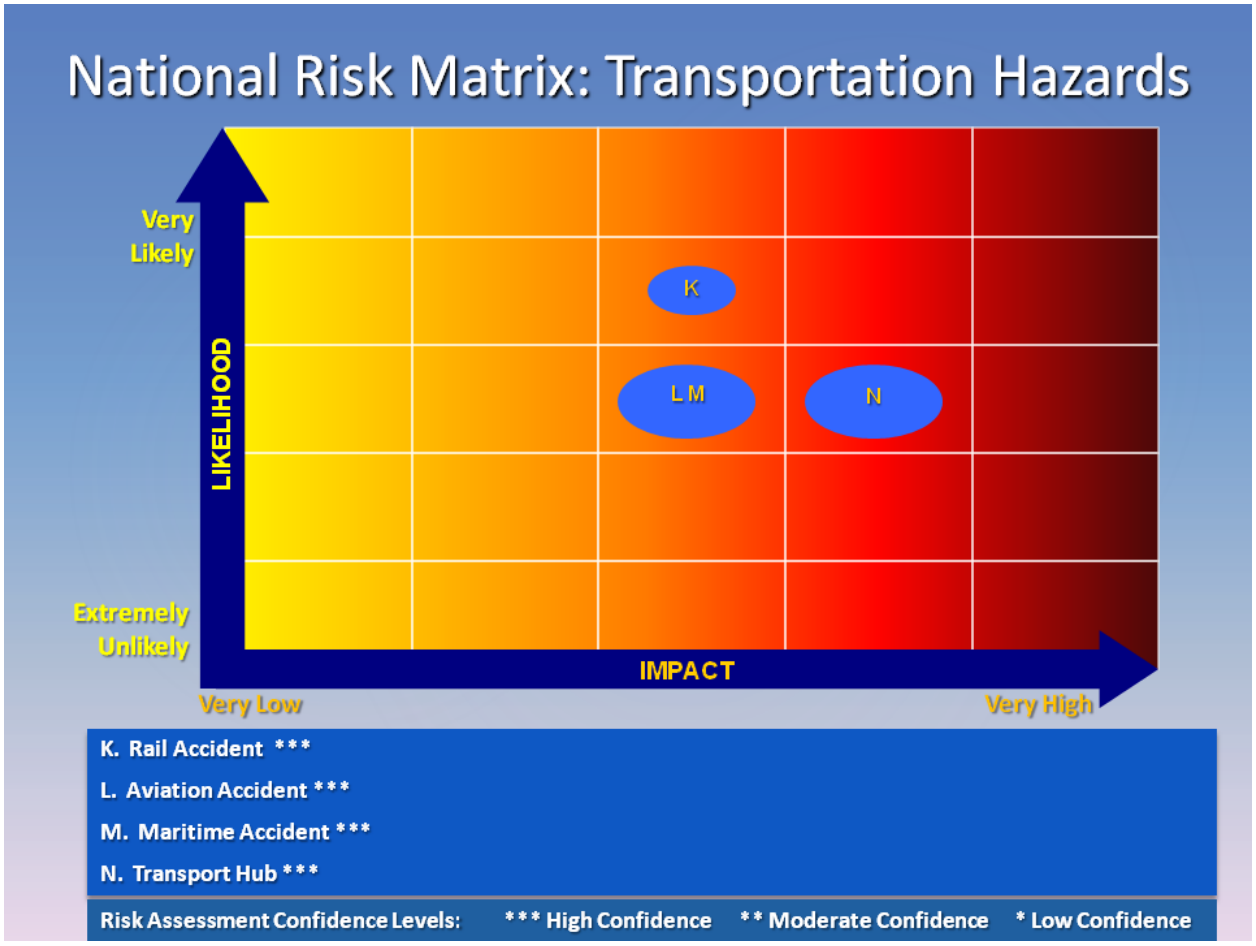

Figure 5: Transportation Risk Matrix

5.2.1 Rail

Although there have been no serious accidents in Ireland since the last national risk process was completed in 2012, there have been 27 near miss events[17]. Significant regulatory oversight, coupled with extensive experience within the national rail

[17] Source: Rail Accident Investigation Unit trend report for the period January 2012 to July 2015.

company, have mitigated against a national rail emergency.

Investment in engineered safety systems were considered as part of this risk assessment.

5.2.2 Aviation

The risk associated with air travel is now extensively modelled, regulated and managed closely. In Ireland, no commercial aviation accident has occurred since 2012. A regional major emergency was declared on 10th February 2011, when a Manx2 Flight with two crew and ten passengers crashed on landing at Cork Airport with the loss of six lives.

5.2.3 Maritime

Ireland has experienced maritime incidents such as the collision of the M.V. Kilkenny and the M.V. Hasselwerder (1991) in Dublin Bay and the oil spill from the Russian aircraft carrier, Admiral Kuznetsov (2009), off the south west coast. A major accident causing pollution could have significant consequences for aquaculture and the leisure and tourism sector (see 5.3.2).

5.2.4 Transportation Hub

Transport hubs, including international airports, seaports, and major railway stations represent critical national infrastructure from an economic and social perspective. Regulatory measures are in place to mitigate and minimize risks. In addition, the PRAs coordinate preparedness across the eight Major Emergency Management (MEM) regions and conduct regular exercises to test the response and coordination arrangements for responding to transport related emergencies.

The reasonable worst case scenario which emerged from the risk assessment Focus Groups was the sinking or running aground of a vessel causing the blockage of the Dublin Port channel. Blocking this key logistical artery and the resultant closure of Dublin Port would have a significant impact on Irish imports and exports. Comprehensive regulation and effective port management are key mitigation measures.

5.2.5 Other Transportation Risks

The risk associated with road transportation was also assessed but did not meet the threshold for inclusion on the National Risk Matrix 2017, but will remain under review by the relevant LGD and/or National Agency.

5.3 Technological Hazards

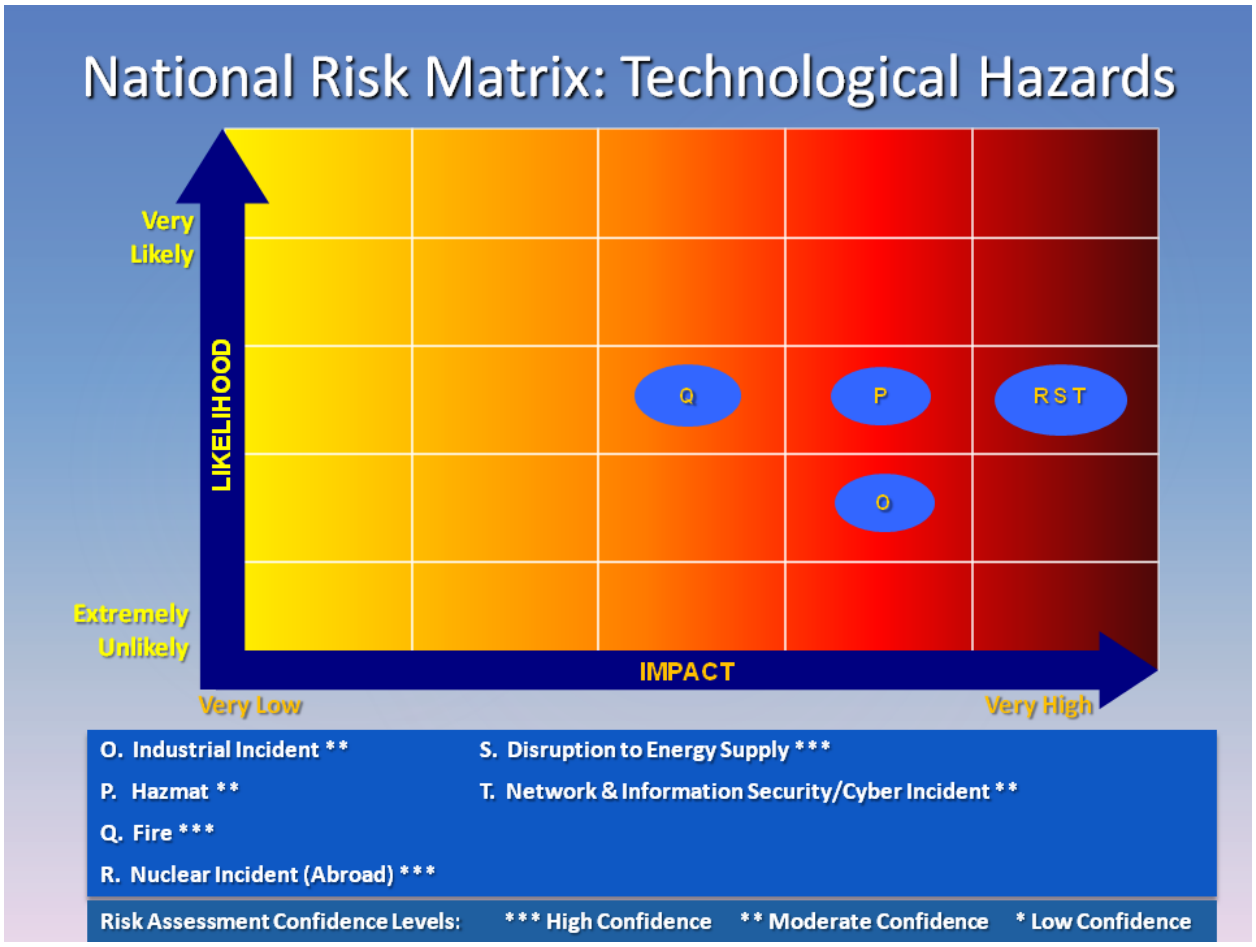

Figure 6: Technological Risk Matrix

5.3.1 Industrial Incident

Ireland has a total of 91 COMAH – Control of Major Accident Hazard - sites (2016 figure). Such sites are subject to significant regulatory control and oversight. Less data is available in relation to sub-COMAH sites, which can house significant quantities (up to 50 tonnes of toxic material and up to 5,000 tonnes of flammable liquid). The reasonable worst case scenario assessed was an incident triggered by hazardous materials at a sub-COMAH site in Dublin Port. The port location is especially significant as a number of COMAH sites are co-located. Such proximity has the potential to trigger a domino effect. Historical data, based on 25 years, indicates that no such incidents have occurred.

The absence of an up-to-date Dangerous Substances Act was considered as part of this risk assessment[18].

5.3.2 Transportation of Hazardous Materials (Hazmat)

Transport of hazardous materials by air, rail, road and sea was considered. The reasonable worst case scenario was an oil tanker at sea shedding its load. There are high environmental and economic impacts that arise as a result of the challenging nature of the required emergency response and the inherent difficulty in effecting containment.

5.3.3 Fire

Fire is a hazard that impacts directly on people, property and/or the environment. The Stardust Ballroom fire on 14 February 1981 is one the most tragic events of our recent history. Following this tragedy a new legislative framework was put in place under the Fire Services Acts 1981 and 2003.

The National Directorate for Fire and Emergency Management provides guidance, policy and protocols on pre-fire planning, the coordination of fire and rescue services, and the effective management of fire-related emergencies. The reasonable worst case scenario assessed was a fire in a nursing home, where residents have reduced mobility.

5.3.4 Nuclear Incident (abroad)

The Environmental Protection Agency (EPA) plays a central role in assessing exposure to ionising radiation and monitoring developments relating to nuclear installations and radiological safety. An accident or terrorist attack at a nuclear installation abroad has the potential to cause widespread low level radioactive contamination of the environment in Ireland.

The EPA report (2016, p.29) indicates the likelihood of a nuclear incident in Sellafield triggering an emergency in Ireland is low since: “For almost 90% of the time, the prevalent meteorological conditions in Ireland would result in any radioactive plume from Sellafield travelling in an easterly direction (away from Ireland)”.

The economic impact of an incident close to Ireland in north-western Europe was assessed by the Economic and Social Research Institute (ESRI) in 2016.

[18] A Working Group has been established by the Department of Jobs, Enterprise and Innovation to identify the necessary measures to replace the outdated Dangerous Substances Act.

The lowest potential impact was assessed at 4 billion euro.

A National Emergency Plan for Nuclear Accidents (NEPNA) and specific supporting sub-plans for the key Departments and Agencies involved in the NEPNA are in place.

5.3.5 Disruption to Energy Supply

A secure, reliable and safe supply of electricity, gas and oil is critical to the economy and society.

The Commission for Energy Regulation has responsibility for monitoring and ensuring security of electricity and gas supplies in Ireland. The Department of Communications, Climate Action and Environment (DCCAE), Regulatory Authorities and industry work to maintain secure energy supplies, manage distribution networks and enhance emergency planning and response arrangements. The ESRI (2011) estimate that loss of gas fired electricity would cost the state up to 1 billion euro per working day.

The DCCAE holds overall responsibility for maintenance of the national oil reserves. Its role includes maintaining and updating contingency plans, liaising with other departments and with the National Oil Reserve Agency (NORA) as well as with the oil industry.

Out of a total reserve supply of 90 days, NORA currently holds approx 2/3rds of this in oil storage facilities in Ireland and the balance is held abroad.

All three energy sources were risk assessed independently and all were given the same rating.

5.3.6 Network and Information Security/Cyber Incident

At individual, national and international levels, a significant dependency on Information and Communications Technology (ICT) now exists. Government, health, transport, manufacturing, banking and electronic payments, power generation, education and a myriad of other commercial and social interactions are underpinned by ICT infrastructure.

Additional risks arise around the personal data created by these interactions, and the use of these networks for a wide range of financial transactions and other critical services. As a consequence of this, the security of networks and information sometimes termed ‘cyber security’ has

become a matter of vital concern for Governments and for those managing such services.

The DCCAE regulates much of the State's telecommunications infrastructure. Cyber incidents are becoming increasingly more sophisticated and potentially damaging and require a well-planned and coordinated response.

There is a very wide range of risks arising from generic low level nuisance issues, through to criminal activities, and/or those culminating in large scale coordinated attacks on infrastructure.

The reasonable worst case scenario adopted was a network attack which compromises key national services and triggers a domino national effect.

5.3.7 Other Technological Risks

The risk posed by radiation originating from sources within the State (Radiation Domestic) was also assessed but did not meet the threshold for inclusion on the National Risk Matrix 2017, but will remain under review by the relevant LGD and/or National Agency.

5.4 Civil Hazards

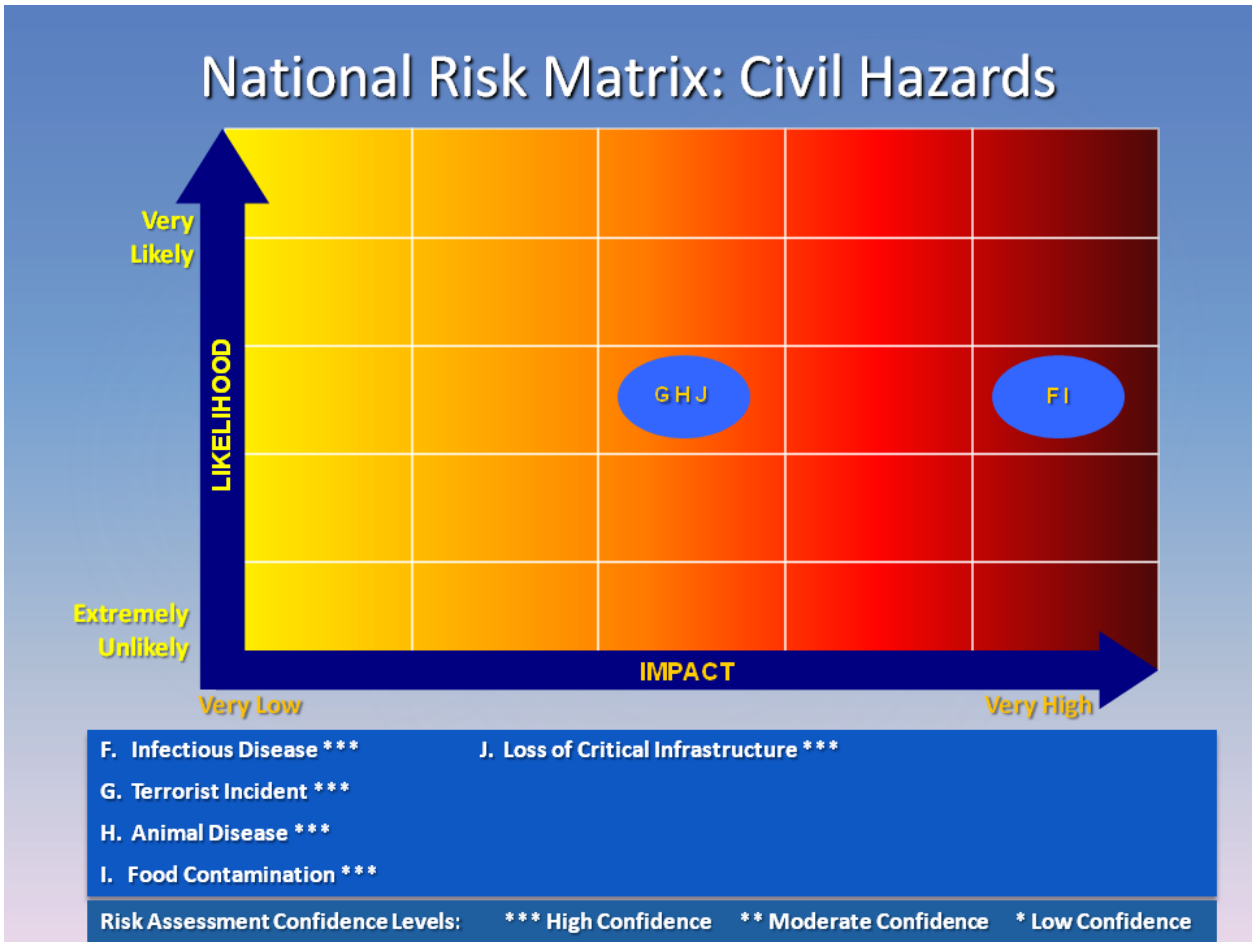

Figure 7: Civil Risk Matrix

5.4.1. Infectious Disease

Every three years a new pathogen emerges. The vast majority are vector borne and, as a result, are not a significant risk in Ireland. The influenza virus mutates continuously and there have been 12 pandemic influenzas since 1895. Pandemic influenza was determined as the reasonable worst case scenario in the Irish context.

Historical evidence shows that such pandemics have the potential to cause death and illness on a significant scale and to disrupt normal social and economic activity. The Department of Health and the Health Protection Surveillance Centre (HPSC) maintain close contact with the European Centre for Disease Control and the World Health Organisation.

These close contacts are used to monitor, predict and mitigate the spread and impact of pandemic influenza, or other infectious disease. Public information campaigns, vaccination programmes and public service continuity plans have enhanced national resilience.

5.4.2 Terrorist Incident

Terrorism can be motivated by a variety of factors, but in general it is activity aimed at intimidating a population, subverting the fundamental structures of a state or unduly influencing Government. Terrorist acts, which may be carried out by groups or individuals, can include but are not limited to bombings, shootings, other violent attack on people or property, kidnap or hijack. An Garda Síochána and the Defence Forces provide the Government with an assessment of the current security threat. The Department of Justice and Equality is the LGD and An Garda Síochána is the Lead Agency in responding to malign threats in Ireland.

The changing nature of the international terrorist threat, characterised by an increasing decentralisation/individualisation of the threat, has been highlighted by terrorist attacks in Europe and internationally in recent years. Based on this new landscape, a reasonable worst case scenario was assessed.

5.4.3 Animal Disease

Transmissible animal diseases having the potential for serious impact and rapid spread are subject to European legislative control measures. These control measures include animal tracking and disease surveillance systems, vaccination programmes, slaughter of infected herds/flocks, and the implementation of movement control zones. National contingency plans are in place for the management of such outbreaks.

An outbreak of disease, such as foot and mouth, was identified as the reasonable worst case scenario. Such an outbreak can have significant economic and social impact. Industries, such as tourism, can also be affected.

The mitigation measures outlined above, particularly the enhanced animal tracking systems, have, in the period since 2012, helped prevent a national animal disease emergency.

5.4.4 Food Contamination

There are extensive measures in place to monitor and prevent contamination of food products. The Food Safety Authority of Ireland (FSAI) is the national body with responsibility for enforcing food safety law in Ireland.

The Authority's principal function is to ensure that food consumed, distributed, marketed or produced in Ireland meets the highest standards of food safety and hygiene.

The departments and agencies involved in food safety deliver a prompt coordinated response, as evidenced during the "horsemeat incident" of 2013. The FSAI is also the Irish central contact point for the EU Rapid Alert System for Food and Feed (RASFF), which provides an early warning system for serious risks detected in food or animal feed internationally.

The reasonable worst case scenario assessed was the contamination of Irish manufactured dairy products, which could have serious reputational and/or economic implications for food production.

5.4.5 Loss of Critical Infrastructure (Water Supply and Distribution Network)

At national level, critical infrastructure includes airports, ports, power and communications networks, transport networks, water supply etc. Many of these, including energy, food, and health, are risk assessed elsewhere in this document.

The reasonable worst case scenario is disruption of the water supply network to a densely populated area of Dublin City. While significant upgrade works are planned for this critical piece of infrastructure, there are response plans currently in place to ensure that a base line service is maintained.

5.4.6 Other Civil Risks

Three additional risks, crowd safety, civil disorder and a waterborne disease outbreak were also risk assessed. They did not meet the threshold for inclusion on the National Risk Matrix 2017, but will remain under review by the relevant LGD and/or National Agency.

SECTION 6. The National Risk Matrix 2017

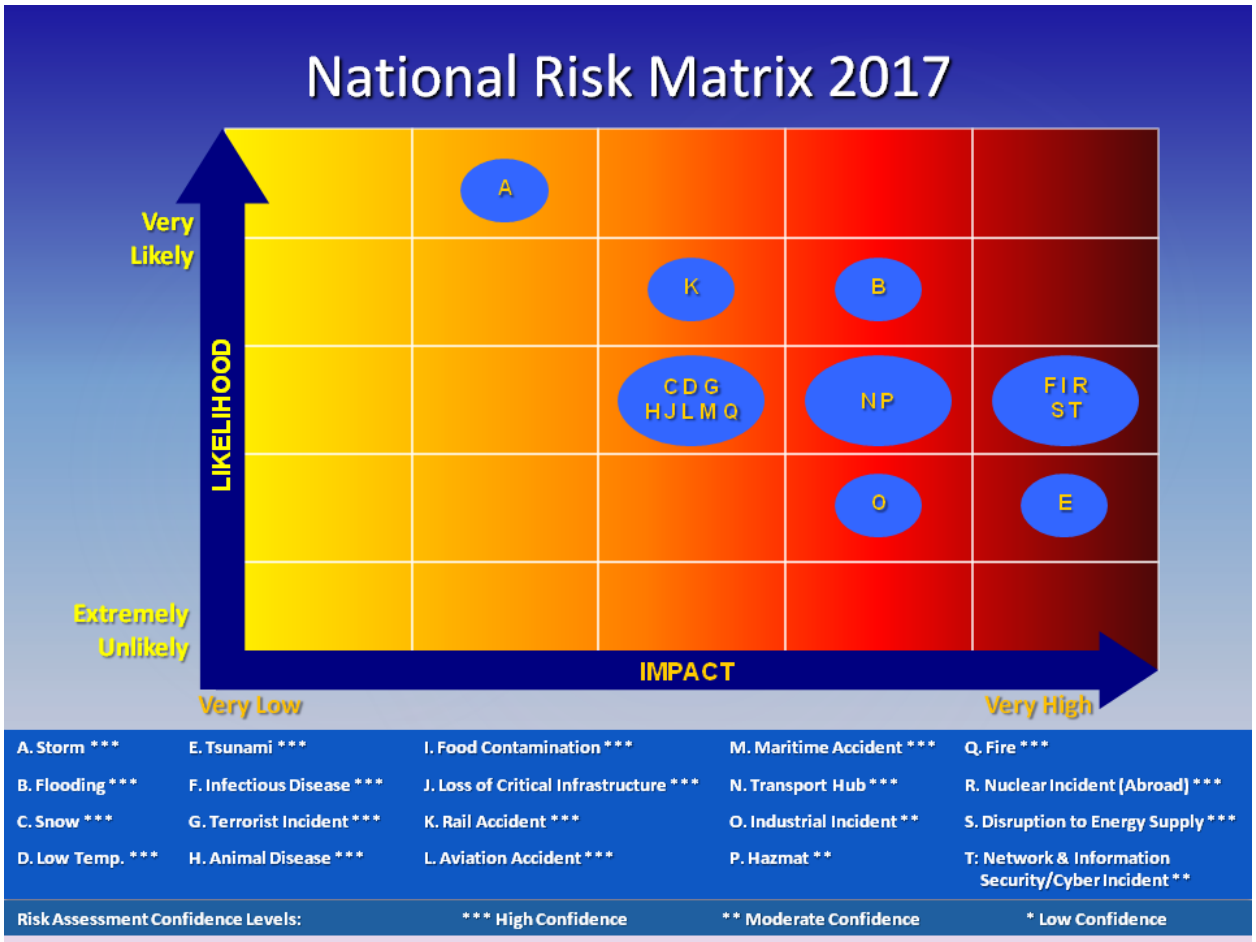

Figure 8: National Risk Matrix 2017

The data from the four individual risk matrices presented in Section 5 are consolidated into the National Risk Matrix above. This National Risk Matrix represents the current assessment of relative risk for the key identified hazards. This assessment is based on expert judgement and the interpretation of appropriate data, where available.

This matrix is used to guide mitigation, planning and preparedness activities at national and regional levels.

Prioritising and resourcing of appropriate mitigation measures are the responsibility of Government, each LGD and relevant bodies under its aegis. Progress on mitigation is managed by each LGD and reported periodically to the GTF.

Risks that were assessed but not plotted on the National Risk Assessment 2017 are recorded and remain under review by the relevant LGD and/or National Agency. For information, a separate matrix capturing these particular risks that were assessed as part of this NRA process is included in Appendix 1 to this document.

This NRA will be reviewed by the GTF on a three year cycle and/or in response to a change in the risk environment.

The output from this NRA will inform future national assessments of risk and emergency management capabilities in Ireland.

The publication of this NRA is intended to enhance public awareness of the significant risks being addressed at a national level by Government through the GTF and the LGDs. In addition it should help build national resilience by encouraging citizens and communities to engage with Government Departments and other state agencies in mitigating key risks and in developing contingency plans.

SECTION 7. References

A Framework for Major Emergency Management 2006. [Online]. Available from: http://mem.ie/framework-documents/ [Accessed 10/01/2017]. National Steering Group on Major Emergency Management.

A National Risk Assessment for Ireland 2012. [Online]. Available from: https://emergencyplanning.ie/media/docs/A%20National%20Risk%20Assessment%20for%20Ireland%20Published.pdf [Accessed 10/01/2017]. Office of Emergency Planning, Department of Defence.

Coppola, D.P. 2015. Introduction to International Disaster Management 3rd Edition. USA: Elsevier.

Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism, [Online]. Available from: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013D1313&qid=1487149320257&from=en [Accessed 10/01/2017].

EPA ND. *Guidance to Licensees/COA holders on the Notification, Management and Communication of Environmental Incidents* [Online]. Available from: https://www.epa.ie/pubs/advice/licensee/Guidance%20to%20licensees.pdf [Accessed 10/01/2017].

European Commission 2017. *Industrial accidents: The Seveso Directive* [Online]. Available from: http://ec.europa.eu/environment/seveso/ [Accessed 10/01/2017].

ISO 31000 2009. *Risk management: Principles and guidelines*. Geneva: International Organization for Standardization.

Leahy, E., Devitt, C., Lyons, S. and Tol, R.S.J. 2012. The Cost of Natural Gas Shortages in Ireland. *Energy Policy*, 46, pp. 153-169

National Emergency Risk Assessment Guidelines 2015. 2nd Edition. Melbourne: Australian Government: Attorney-General's Department

APPENDIX 1.

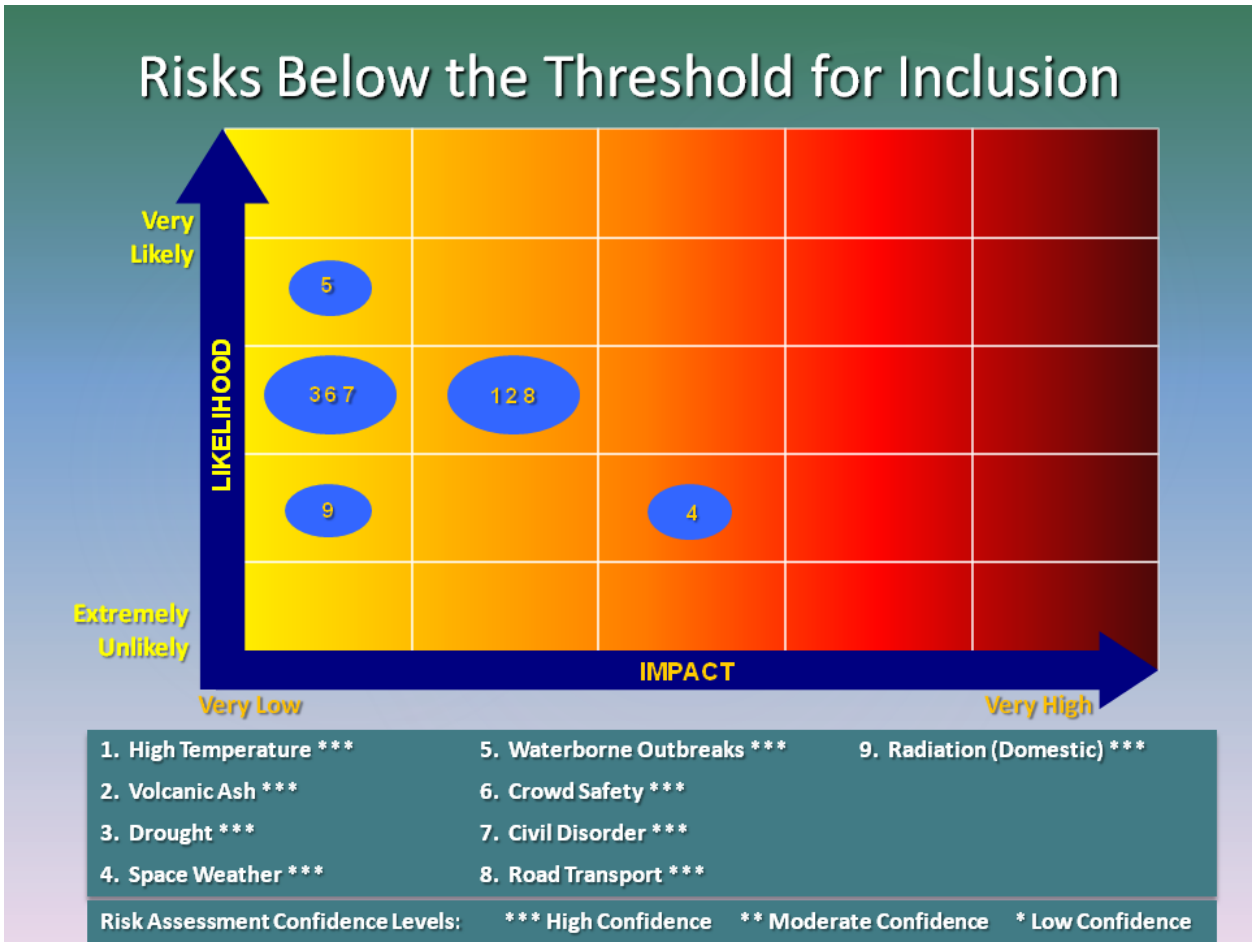

Figure 9 – Risks below the threshold for inclusion in the National Risk Matrix

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