
GUIDELINE

CONDUCTING COMPREHENSIVE DISASTER RISK ASSESSMENTS

PART 1: HAZARD IDENTIFICATION, ANALYSIS AND PRIORITISATION



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Frameworks

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Version Control

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Index

List of figures	5
List of tables.....	5
Acronyms.....	6
Definitions	7
Interrelation / compatibility with other guidelines.....	9
1. Introduction	10
2. Purpose of this guideline	10
3. Scope	11
4. How to use this guideline	12
5. Hazard Identification, - Analysis and - Prioritisation	12
5.1 Hazard Identification.....	12
5.2 Hazard Analysis	14
5.2.1 Affected area.....	14
5.2.2 Probability	14
5.2.3 Frequency	15
5.2.4 Predictability.....	15
5.2.5 Magnitude	16
5.3 Hazard Prioritisation	16
6. Recommendations	17
7. Approval	18
8. Templates	19
9. List of References	19
10. Appendices	20



Appendix A: Guidelines and Regulations called for in the DMA, NDMF, Best Practice and other Guidelines already issued by the NDMC20

List of figures

Figure 1: Disaster risk assessment process 11

List of tables

Table 1: Affected area analysis 14
Table 2: Probability analysis..... 15
Table 3: Frequency analysis 15
Table 4: Predictability analysis 16
Table 5: Magnitude analysis..... 16



Acronyms

DMA	Disaster Management Act, 2002 (Act No. 57 of 2002)
DRA	Disaster Risk Assessment
HAT	Hazard Assessment Tool
KPA	Key Performance Area
NDMAF	National Disaster Management Advisory Forum
NDMC	National Disaster Management Centre
NDMF	National Disaster Management Framework, 2005
UNISDR	United Nations International Strategy for Risk Reduction



Definitions

The following words and expressions will, unless the context otherwise requires or the Disaster Management Act, 2002 (Act No. 57 of 2002) (DMA) or National Disaster Management Framework, 2005 (NDMF) otherwise provides, have the meanings hereby assigned to them namely—

“Capacity” means a combination of all the strengths, attributes and resources available within a community, society or organization that can reduce the level of risk or the effects of a disaster (UNISDR:2009).

“Disaster risk” means the magnitude of potential disaster losses, in lives, livelihoods and assets, which could occur to a particular community or group, arising from their exposure to possible future hazard events and their vulnerability to these hazards (UNISDR:2009).

“Disaster risk reduction” means action(s) taken to reduce the risk of disasters and the adverse impacts of natural hazards, through systematic efforts to analyse and manage the causes of disasters, including through avoidance of hazards, reduced social and economic vulnerability to hazards, and improved preparedness for adverse events (UNISDR:2009).

“Hazard” means a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption or environmental damage (UNISDR:2007).

“Hazard Identification” means the process of determining and identifying potential hazards using purposive sampling that could harm or expose people, property, services, livelihoods or environment they depend on.



“**Hazard Analysis**” means outlining the nature of each hazard in terms of its defined characteristics.

“**Hazard Prioritization**” means the process of comparing the results of hazard analysis with risk criteria to determine whether the hazard risk and/or its magnitude is acceptable or tolerable.

“**Risk**” means the likelihood of harmful consequences, including losses of lives, livelihoods and property, injuries, disruption of economic activities or environmental damages, arising from the combination of hazards with exposed and vulnerable people and assets (UNISDR:2009).

“**Vulnerability**” means the degree to which an individual, household, community or an area may be adversely affected by a disaster (DMA 57:2002).



Interrelation / compatibility with other guidelines

Policies and practices for disaster management should be based on a “common” understanding of disaster risks and all its dimensions in terms of the hazard, vulnerability and capacity characteristics. The Sendai Framework for Disaster Risk Reduction (UNISDR, 2015) also alludes to the fact that such understanding has a bearing in the development and implementation of appropriate and effective disaster management programmes. Therefore, this guide should also give leverage in this regard

It is envisioned that this guideline may provide the backbone for a number of other guidelines listed in the DMA and the National Disaster Management Framework, 2005 (NDMF) (see **Appendix A**). Not only is this a precursor to other plans (e.g. the development of disaster risk management plans), it is also necessary for a standardized implementation of others (e.g. sector wide disaster management). The interaction with other guidelines will be described in those guidelines when developed.



1. Introduction

Section 8 of the DMA establishes the National Disaster Management Centre (NDMC) with the objective to promote an integrated and coordinated system of disaster management, with special emphasis on prevention and mitigation by national, provincial and municipal organs of state, statutory functionaries, other role players and communities. The DMA also, in Section 15, assigns various powers and duties to the NDMC which amongst others includes not only advisory and consultative functions, but also the power to make recommendations and give guidance (in particular in Section 22) to stakeholders with regards to disaster management.

2. Purpose of this guideline

The Hyogo Framework for Action 2005-2015 indicates that the starting point for reducing disaster risk lies in the knowledge of the hazards and the physical, social, economic and environmental vulnerabilities and also ways in which hazards and vulnerabilities are changing in the short and long term, followed by action taken on the basis of that knowledge (UNISDR, 2005).

This guideline provides the methodology to identify, analyse and prioritise the hazard component as part of the broader comprehensive disaster risk assessment process. The main outcome of using the guideline, is a ranking of the priority hazards of the community/municipality/province as the case may be and should form the basis for risk reduction planning.



3. Scope

The academic and operational discourse on the methodology to assess disaster risk is extremely diverse, rich and comprehensive. The NDMF builds on the commonly used method of assessing disaster risk and as adapted by the United Nations International Strategy for Risk Reduction (UNISDR) as:

$$\text{Disaster risk} = \frac{\text{Hazards} \times \text{Vulnerability}}{\text{Capacity}}$$

Figure 1: Disaster risk assessment process

Source: UNISDR, 2005

This guideline does not encompass the full spectrum of disaster risk assessment set out in the NDMF but prioritises the **first step** of conducting a comprehensive disaster risk assessment. It provides a feasible systematic process of hazard identification, analysis and prioritization as the first step in determining the level of risk of an area in line with the requirements set out in Key Performance Area (KPA) 2 of the NDMF (section 2.1.2) and Section 19 of the DMA.

This guideline only identifies hazards, analyse the hazards identified in respect to set criteria¹ for the affected area, probability, frequency, predictability and magnitude and assigns priority to the hazard according to the analysis.

In this regard the guideline is accompanied by a Hazard Assessment Tool² (HAT) that outlines core parameters for the hazard analysis taking into account the legislative framework, international best practice, the complexities of the data, theory and disaster management administrative environment.

¹ Criteria for the analysis of 'speed of onset' and 'duration' has not been defined

² The HAT is an electronic Microsoft Excel Spreadsheet developed to analyse the respective hazards identified for an area using the hazard analysis criteria set out in this guideline. The HAT can be downloaded from the NDMC website at <http://www.ndmc.gov.za/Documents/PriorityGuidelines.aspx>



4. How to use this guideline

This guideline is used in conjunction with the HAT and entails four steps.

Step 1: Review the hazard list, set out in paragraph 5.1, for the respective area to ensure that all prevalent hazards that may occur in the area is identified.

Step 2: Analyse hazards using the HAT and the respective criteria set out in paragraph 5.2 using as many different information sources available.

Step 3: Review the outcome of the hazard analysis by ranking the hazards, from highest to lowest score achieved.

Step 4: Report the outcome of the analysis to the NDMC and other relevant stakeholders

5. Hazard Identification, - Analysis and - Prioritisation

The hazards component of the risk assessment process set out in **figure 1** comprise hazard identification, hazard analysis and hazard prioritisation.

5.1 Hazard Identification

The NDMC through a process of consultation with various stakeholders, using purposive sampling, established the hazards listed below as the national hazard list.



Conducting Comprehensive Disaster Risk Assessments

Part 1: Hazard Identification, Analysis and Prioritisation

- Seismic event (Earthquake)
- Erosion
- Geochemical hazards
- Tsunamis
- Avalanche, snow, debris
- Coastal erosion
- Debris/Mud flow/Rock fall/Landslide
- Flash flood
- Flood (Coastal)
- Flood (Urban infrastructure)
- Flood (Estuarine)
- Flood (Riverine)
- Flood (Raised water table)
- Doline / Sinkhole / Subsidence
- Hydrological drought
- Land degradation
- Cold wave
- Meteorological drought
- Frost/Freeze
- Hail
- Heat wave
- Lightning
- Heavy/Persistent rain
- Sandstorm/Dust storm
- Snow/Ice
- Storm surge
- Tornado
- Strong wind
- Tropical cyclone
- Convective storm
- Fire – Cultivated forest
- Veldfire
- Agricultural drought
- Reportable human disease
- Reportable animal disease
- Reportable plant disease
- Pest infestation
- Solar storm/Flares
- Pollution – Water
- Pollution – Air
- Pollution – Terrestrial
- Structural Collapse
- Industrial accident
- Road accident
- Air accident
- Sea accident
- Rail accident
- Leak/Spill
- Radioactive emissions
- Urban formal fire
- Urban informal fire
- Critical infrastructure
- Social unrest



5.2 Hazard Analysis

Hazard analysis refers to the process of outlining the nature of each hazard listed in terms of the defined criteria for the affected area, probability, frequency, predictability and magnitude.

5.2.1 Affected area

The affected area is analysed in terms of the geographical area affected according to the criteria set out in **Table 1**.

Table 1: Affected area analysis

Criteria	Score
<i>Affect a Very Small Area e.g Village</i>	1
<i>Affect an area like a ward</i>	2
<i>Affect an area like a local municipality</i>	3
<i>Affect Multiple Local Municipalities / A District Municipality / Metropolitan Municipality</i>	4
<i>Affect Multiple DM's / Metropolitan Municipalities / Province / National</i>	5

5.2.2 Probability

The probability of a hazard is analysed on how probable an event is to occur in a given area and space of time according to the criteria set out in **Table 2**.

**Table 2:** Probability analysis

Criteria	Score
<i>Highly improbable</i>	1
<i>Slight Possibility</i>	2
<i>50/50 Chance</i>	3
<i>Very Good Chance</i>	4
<i>100% Certain</i>	5

5.2.3 Frequency

The frequency of a hazard is analysed on how often does the hazard occur according to the criteria set out in **Table 3**.

Table 3: Frequency analysis

Criteria	Score
<i>>20 Years</i>	1
<i>1 – 20 years</i>	2
<i>Annually</i>	3
<i>Monthly</i>	4
<i>Weekly</i>	5

5.2.4 Predictability

The predictability of a hazard is analysed on degree of how foreseeable the hazard is according to the criteria set out in **Table 4**.

**Table 4:** Predictability analysis

Criteria	Score
<i>100% Predictable</i>	1
<i>Fairly Accurate to Predict</i>	2
<i>50/50 Chance to Predict</i>	3
<i>Slight Chance to Predict</i>	4
<i>Cannot Predict</i>	5

5.2.5 Magnitude

The magnitude of a hazard is analysed on how severe the hazard affects the affected area according to the criteria set out in **Table 5**.

Table 5: Magnitude analysis

Criteria	Score
<i>Low</i>	1
<i>Low to Medium</i>	2
<i>Medium</i>	3
<i>Medium to High</i>	4
<i>High</i>	5

5.3 Hazard Prioritisation

Hazard prioritisation refers to the process of sorting or ranking the identified hazards from highest to lowest, using the numerical value obtained from the hazard analysis.



6. Recommendations

It is recommended that all organs of state across the spheres of government, enjoined by the Disaster Management Act, 2002 (Act 57 of 2002) and the National Disaster Management Framework, 2005 to develop a disaster management plan,

- 6.1 have regard and consider this guideline when conducting comprehensive risk assessments for their functional area;
- 6.2 adopt a participatory approach with regards to its hazards identification, analysis and prioritisation process by consulting the communities and other stakeholders thereby promoting understanding of the hazards/threats as perceived by the people and combine this community knowledge and perceptions with the scientific data used; and
- 6.2 provide the National Disaster Management Centre and other organs of state with the outcome of their hazard identification, analysis and prioritisation.



7. Approval

Mr Jurgens Dyssel

Director: Policy Development and Regulatory Frameworks

Date: 28 July 2016.

Ms Ane Bruwer

Chief Director: Policy and Legislation Management

Date: 28 July 2016

Guideline approved/.....

Mr Ken Terry

Head: National Disaster Management Centre

Date: 31.3.2016



8. Templates

The HAT provides the input template³.

9. List of References

SOUTH AFRICA. 2002. Disaster Management Act No. 57 of 2002. Cape Town: Government Printers.

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UNISDR **see** United Nations International Strategy for Disaster Reduction.WHO **see**

³ The HAT is an electronic Microsoft Excel Spreadsheet developed to analyse the respective hazards identified for an area using the hazard analysis criteria set out in this guideline. The HAT can be downloaded from the NDMC website at <http://www.ndmc.gov.za/Documents/PriorityGuidelines.aspx>



10. Appendices

Appendix A: Guidelines and Regulations called for in the DMA, NDMF, Best Practice and other Guidelines already issued by the NDMC

Guideline
Guidance on the application of DMA where an occurrence can effectively be dealt with by other legislation aimed at reducing the risk, and addressing the consequences of occurrences of that nature
Procedure to develop disaster management guidelines
Guidelines for the preparation and regular reviewing of disaster management plans and strategies
Guidelines for the integration of the concept and principles of disaster management, and particularly strategies on prevention and mitigation, with National, provincial and municipal development plans, programs and initiatives
Guidelines to organs of state etc. to assess and prevent or reduce the risk of disasters
National guidelines for the minimum infrastructural requirements for disaster management centers.
National guidelines outlining the criteria for the registration of volunteers.
National guidelines for mutual assistance agreements.
National standard and guidelines for conducting comprehensive disaster risk assessments.
National guidelines for the application of a uniform disaster risk assessment methodology and the standardisation of a format for disaster risk assessments.
National standard and guidelines for assessing priority disaster risks in national, provincial and municipal spheres.
National guidelines specifying the requirements for each progressive level of disaster risk management plan, from a Level 1 Disaster Risk Management Plan to a Level 3 Disaster Risk Management Plan, for use by national, provincial and municipal organs of state.



Guideline
National guidelines to ensure uniform disaster risk management planning and implementation.
National guidelines for the incorporation of disaster risk reduction programmes and initiatives into the activities of other national organs of state and key institutional role players.
National guidelines for conducting disaster (<i>impact</i>) assessments.
National guidelines for the classification and declaration of states of disaster.
National guidelines for the process and procedures to be followed in conducting reviews of significant events and events classified as disasters.
National guidelines (set out in FOGs) for the various activities associated with disaster response and recovery.
Regulations for the management of relief operations.
National guidelines for the implementation of the integrated information and communication system in provincial and municipal spheres.
National guidelines for disaster risk management programme and project management.
National guidelines for a disaster risk management performance measurement, monitoring and evaluation system.
National guidelines for the design and content of disaster risk management education and training programmes.
National guidelines for the development and accreditation of course materials for accredited education and training programmes.
National guidelines for the registration of disaster risk management education and training institutions and organisations
National guidelines for the accreditation and registration of trainers, facilitators and service providers.
National guidelines for the design and development of public awareness programmes related to risk-avoidance behaviour.
National guidelines for media relations.



Guideline
National guidelines and a composite index containing criteria for identifying low capacity, resource-poor municipalities for the purpose of conditional grant allocations.
National guidelines for evaluating applications for additional funding for projects and activities aimed at reducing priority disaster risks.
National guidelines setting out the thresholds applicable to provincial and municipal organs of state for accessing additional funding from national government for response efforts
National guidelines containing criteria for classifying different types of infrastructure for the purposes of funding structural infrastructure mitigation projects.
National guidelines containing criteria for identifying priority infrastructure for the purposes of rehabilitation and reconstruction.
National guidelines for mechanisms to roll out funding for the implementation of the national disaster management framework.
Regulations by National Treasury to allow immediate access to funds for response operations in the event of a national disaster.
Preparation and publishing of Annual Report
The implementation of a multi-agency response management system.
Response to chemical incidents
Template for the development of a disaster risk management policy framework for a province
National Platforms
Guide for the prevention and Mitigation for crowd stampede hazards during a mass gathering event
Guide to safety at sports grounds
Guideline for the writing and planning Terms of Reference
Guideline for the aged in disaster management
Guideline for woman in disaster management
Guideline for children in disaster management
Guideline for people with disabilities in disaster management



Conducting Comprehensive Disaster Risk Assessments
Part 1: Hazard Identification, Analysis and Prioritisation

Guideline
Guideline for building disaster resilient communities
Field Guide to Humanitarian Mapping
Draft guidelines: Tsunami early warning system for South Africa
Guidelines for the Technical Task Teams of the National Disaster Management Advisory Forum (NDMAF)
Guidelines for reducing flood loss

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CONDUCTING COMPREHENSIVE DISASTER RISK ASSESSMENTS

PART 1: HAZARD ANALYSIS

Conducted by:

Eden District Municipality

Date Conducted at:

30/12/2015

Name of Area

Ward 12

Season

Winter

level

HAZARD	RATINGS					TOTAL
	AFFECTED AREA	PROBABILITY	FREQUENCY	PREDICTABILITY	MAGNITUDE	
<u>Seismic Event (Earthquake)</u>	Affect an area like a local municipality	Highly Improbable	> 20 yrs	Cannot Predict	Medium	13,00
<u>Erosion</u>	Affect a Very Small Area e.g Village	Very Good Chance	Weekly	Fairly Accurate to Predict	Low	13,00
<u>Geochemical Hazards</u>	Affect a Very Small Area e.g Village	Slight Possibility	1 - 20 yrs	Slight Chance to Predict	Low to Medium	11,50
<u>Tsunami</u>	Affect an area like a local municipality	Slight Possibility	> 20 yrs	100% Predictable	Medium	10,00
<u>Avalanche, Snow, Debris</u>	Affect a Very Small Area e.g Village	50/50 Chance	Annually	Fairly Accurate to Predict	Low to Medium	11,50
<u>Coastal Erosion</u>	Affect a Very Small Area e.g Village	Very Good Chance	Weekly	Fairly Accurate to Predict	Low	13,00
<u>Debris / Mud Flow / Rockfall / Landslide</u>	Affect a Very Small Area e.g Village	50/50 Chance	Annually	50/50 Chance to Predict	Low to Medium	12,50
<u>Flash Flood</u>	Affect a Very Small Area e.g Village	100% Certain	Monthly	50/50 Chance to Predict	Medium to High	18,50
<u>Flood (Coastal)</u>	Affect an area like a ward	Very Good Chance	Monthly	Slight Chance to Predict	Low to Medium	16,00
<u>Flood (Urban Infrastructure)</u>	Affect an area like a local municipality	Very Good Chance	Monthly	Slight Chance to Predict	Medium	18,00
<u>Flood (Riverine)</u>	Affect an area like a local municipality	Very Good Chance	Monthly	Slight Chance to Predict	Medium	17,00
<u>Flood (Raised Watertable)</u>	Affect an area like a local municipality	50/50 Chance	Monthly	Slight Chance to Predict	Medium to High	17,00
<u>Doline / Sinkhole / Subsidence</u>	Affect a Very Small Area e.g Village	Very Good Chance	Monthly	50/50 Chance to Predict	Medium to High	17,50
<u>Hydrological Drought</u>	Affect Multiple DM's / Metropolitan Municipalities / Province / National	Slight Possibility	1 - 20 yrs	Fairly Accurate to Predict	Medium	12,00
<u>Land degradation</u>	Affect an area like a ward	50/50 Chance	1 - 20 yrs	Slight Chance to Predict	High	19,00
<u>Cold Wave</u>	Affect an area like a ward	Slight Possibility	Annually	50/50 Chance to Predict	Low to Medium	12,00
<u>Meteorological Drought</u>	Affect an area like a local municipality	100% Certain	Annually	Fairly Accurate to Predict	Medium	16,00
<u>Frost / Freeze</u>	Affect Multiple DM's / Metropolitan Municipalities / Province / National	50/50 Chance	1 - 20 yrs	Slight Chance to Predict	High	19,00
<u>Hail</u>	Affect an area like a ward	Slight Possibility	Monthly	Slight Chance to Predict	Low to Medium	14,00
<u>Heat Wave</u>	Affect a Very Small Area e.g Village	Very Good Chance	Annually	Slight Chance to Predict	Low to Medium	13,50
<u>Lightning</u>	Multiple Local Municipalities / A District Municipality / Metropolitan Municipality	Highly Improbable	> 20 yrs	50/50 Chance to Predict	Low	9,50
<u>Heavy / Persistent Rain</u>	Affect a Very Small Area e.g Village	50/50 Chance	Monthly	Slight Chance to Predict	Medium to High	17,50
<u>Sandstorm / Duststorm</u>	Multiple Local Municipalities / A District Municipality / Metropolitan Municipality	Very Good Chance	Weekly	Fairly Accurate to Predict	Medium to High	19,00
<u>Snow / Ice</u>	Affect a Very Small Area e.g Village	Slight Possibility	Annually	50/50 Chance to Predict	Low to Medium	11,50
<u>Storm Surge</u>	Affect a Very Small Area e.g Village	Very Good Chance	Annually	50/50 Chance to Predict	Medium	15,50
<u>Tornado</u>	Affect an area like a ward	50/50 Chance	Monthly	50/50 Chance to Predict	Low to Medium	13,50
<u>Strong Wind</u>	Affect an area like a ward	Slight Possibility	Annually	Slight Chance to Predict	Low to Medium	13,00
<u>Tropical Cyclone</u>	Affect an area like a local municipality	100% Certain	Annually	Fairly Accurate to Predict	Medium to High	17,50
<u>Convective Storm</u>	Affect an area like a local municipality	Slight Possibility	Annually	Fairly Accurate to Predict	Medium	13,00
	Affect an area like a local municipality	Slight Possibility	Annually	50/50 Chance to Predict	Medium	14,00

Fire - Cultivated Forest	Multiple Local Municipalities / A District Municipality / Metropolitan Municipality	100% Certain	Weekly	Slight Chance to Predict	Medium to High	22,00
Wildfire	Multiple Local Municipalities / A District Municipality / Metropolitan Municipality	100% Certain	Weekly	Slight Chance to Predict	Medium to High	22,00
Agricultural Drought	Affect Multiple DM's / Metropolitan Municipalities / Province / National	Slight Possibility	1 - 20 Yrs	Slight Chance to Predict	High	18,00
Reportable Human Disease	Affect an area like a ward	50/50 Chance	Annually	Cannot Predict	Medium	16,50
Reportable Animal Disease	Affect an area like a local municipality	50/50 Chance	1 - 20 Yrs	Cannot Predict	Low to Medium	14,50
Reportable Plant Disease	Affect an area like a ward	50/50 Chance	1 - 20 Yrs	Slight Chance to Predict	Low	11,50
Pest Infestation	Affect an area like a local municipality	50/50 Chance	1 - 20 Yrs	Fairly Accurate to Predict	Low to Medium	11,50
Solar Storm / Flares	Affect Multiple DM's / Metropolitan Municipalities / Province / National	Slight Possibility	> 20 yrs	50/50 Chance to Predict	Medium to High	14,50
Pollution - Water	Affect an area like a local municipality	100% Certain	Annually	Fairly Accurate to Predict	Medium	16,00
Pollution - Air	Affect an area like a local municipality	Very Good Chance	Annually	Fairly Accurate to Predict	Medium	15,00
Pollution - Terrestrial	Affect a Very Small Area e.g Village	Very Good Chance	Annually	Fairly Accurate to Predict	Medium	14,00
Structural Collapse	Affect a Very Small Area e.g Village	Slight Possibility	1 - 20 yrs	Fairly Accurate to Predict	Medium to High	15,50
Industrial Accident	Affect a Very Small Area e.g Village	50/50 Chance	Annually	Cannot Predict	Medium to High	17,50
Road Accident	Affect a Very Small Area e.g Village	100% Certain	Weekly	Slight Chance to Predict	Low	16,00
Air Accident	Affect a Very Small Area e.g Village	Slight Possibility	> 20 yrs	Cannot Predict	Medium to High	14,50
Sea Accident	Affect a Very Small Area e.g Village	Slight Possibility	> 20 yrs	Cannot Predict	Medium	14,00
Rail Accident	Affect a Very Small Area e.g Village	Slight Possibility	1 - 20 yrs	Cannot Predict	Medium	14,00
Leak / Spill	Affect a Very Small Area e.g Village	Slight Possibility	1 - 20 yrs	Cannot Predict	Low to Medium	12,50
Radioactive Emissions	Affect Multiple DM's / Metropolitan Municipalities / Province / National	50/50 Chance	Annually	Slight Chance to Predict	Medium	15,00
Urban Formal Fire	Affect an area like a ward	Slight Possibility	> 20 yrs	Cannot Predict	High	18,00
Urban Informal Fire	Affect an area like a ward	100% Certain	Monthly	Slight Chance to Predict	Low to Medium	17,00
Critical Infrastructure Failure	Affect a Very Small Area e.g Village	100% Certain	Monthly	Slight Chance to Predict	Medium to High	20,00
Social Unrest	Affect an area like a ward	Slight Possibility	> 20 yrs	Cannot Predict	Medium to High	14,50
	Very Good Chance		Monthly	50/50 Chance to Predict	Medium	16,50