

## **Annex B – SMUG Model for Prioritising Hazards**

### **Introduction**

The Civil Defence Emergency Management Group Plan (CDEMG Plan) will describe hazards and risks that the Islands are prone to. As it is highly unlikely we will address all of the hazards and risks within the Islands in the 5-year period of the CDEM Group Plan, it is necessary to identify those hazards, which should be priorities for future risk treatment.

The Ministry of Civil Defence and Emergency Management recommended the SMUG method for Prioritising risks associated with natural and technological hazards. This method suggests that Seriousness, Manageability, Urgency, and Growth, should be the criteria used for prioritisation. The SMUG model provides a method to prioritise those hazards which represent the greatest risk, and can be effectively treated in the future by putting effort into managing the risks posed by these hazards, across the each of the 4R's (reduction, readiness, response and recovery).

### **A basis for risk prioritisation - The SMUG Model**

The definitions of seriousness, manageability, urgency and growth that will be used to prioritise hazards for the Chatham Islands CDEM Group Plan are as follows.

#### **Seriousness**

The relative impact in terms of people and or dollars. The number of lives lost and potential for injury, and the physical, social and economic consequences of a hazard event.

#### **Manageability**

The relative ability to mitigate or reduce the hazard (through managing the hazard, or the community, or both). Manageability refers to how well a hazard could be managed in the future. If a hazard has the potential to be mitigated against and the risk significantly reduced by putting more emphasis on risk reduction initiatives for those hazards in the future, it would be rated high.

#### **Urgency**

The measure of how imperative or critical it is to address the hazard (associated with the probability of the risk of the hazard).

#### **Growth**

The rate at which the risk from the hazard will increase through either an increase in the probability of the extreme event occurring, an increase in the exposure of the community, or combination of the two.

The numeric ratings assigned to each of the four-prioritisation criteria for the Chatham Islands CDEMG Plan (seriousness, manageability, urgency and growth) are provided in Table A1.1

**Table A1.1:** The numeric score that was assigned to the high, medium, and low ratings for the four criteria to be used in the SMUG prioritisation model for the Plan.

<b>Seriousness</b>	High = 4-5	Medium = 2-3	Low = 0-1
<b>Manageability</b>	High = 7+	Medium = 5-7	Low = 0-4
<b>Urgency</b>	High = 20yr >	Medium = 20<	Low = 100yrs
<b>Growth</b>	High = 3	Medium = 2	Low = 1

### **Application of the SMUG Model**

In order to prioritise hazards in terms of the four criteria specified in the SMUG model (Seriousness, Manageability, Urgency, and Growth), an understanding of the risks posed by these hazards, and how they can be managed more effectively, is required. Reviewing hazard and hazard reports, existing plans, and having discussions with people who have had significant experience with either managing or researching hazards in the Chatham Islands will generate the summaries of risk posed by different natural and technological hazards.

Summarized hazard and risk information will be provided to a range of people from a variety of CDEMG member organizations, who will rate the hazards in terms of Seriousness, Manageability, Urgency, and Growth.

### **Method for Rating Seriousness**

#### **Seriousness**

The relative impact in terms of people or dollars. When rating seriousness, the number of lives lost and potential for injury and the physical, social, and economic consequences of a hazard event are specifically considered.

For each of the hazards described in Table 4.2, a seriousness score of 0-5 is assigned to each vulnerable element (lives lost and injuries, physical, social, and economic components of the community). These are added together to attain a total seriousness score. The top third of the range of seriousness scores were assigned a High rating; the middle third of the range of seriousness scores were assigned a Low rating.

***Note: when rating seriousness, current risk treatment measures that are in place are taken into account.***

### **Method for Rating Manageability**

The manageability rating is an estimate of how much extra effort is required for each hazard, across each of the 4R's (reduction, readiness, response and recovery), to reach the desired level of preparedness for each R.

A manageability rating for each hazard is determined by using the following 5-step process:

- For each hazard, the ideal amount of effort that should be spent treating the risk across each of the 4R's is estimated. A total of 12 points is spread across the 4R's to represent the relative amount of effort that should ideally be spent on each R.
- The actual amount of effort that is or has been spent by the Chatham Islands Civil Defence Emergency Management Group agencies on each of the 4R's is estimated for each hazard. No more than 12 points is spread across the 4R's to represent the relative amount of effort that is actually spent on each R.

- The difference between the ideal and actual amounts of effort that is spent on risk treatment across each of the 4R's is then calculated for each hazard.
- The difference between ideal and actual values for Reduction is added to the ideal-actual differences for Readiness, Response, and Recovery components (refer to example for each hazard).
- The hazards with a total difference greater than 7 received a High rating, and those with a total difference less than 7 received a Low rating.

**High** Total score of future effort required >7  
**Medium** 5<total score of future effort required <7  
**Low** Total score of future effort required <4

### Example for Rating Manageability

For example, if steps 1-5 were undertaken for flooding hazard, the results may look something like....

Hazard	4R's	Ideal	Actual	Ideal-Actual	Total Difference
Flooding	Reduction	4	3	1	
	Readiness	3	2	1	
	Response	3	2	1	
	Recovery	2	1	1	
		<b>12</b>			4 LOW

### Method for Rating Urgency

#### Urgency

The measure of how imperative or critical it is to address the hazard (associated with the probability of the risk of the hazards). Assign a High, Medium or Low rating for the Urgency criteria, based upon the hazard return period.

#### Rate Urgency

Low urgency - > 200 yr return period  
 Moderate urgency - 20-200 yr return period  
 High urgency - < 20 yr return period.

### Climate Change and Other Considerations

There are many factors that make the impacts of hazards worse with time such as climate change, increasing or ageing population etc. These exacerbate (worsen) hazard impacts such as the intensity or frequency of storms. The Hazards Liaison Group considers these factors when rating Urgency and Growth.

### Method for Rating Growth

#### Growth

The rate at which the risk from the hazard will increase through either an increase in the probability of the extreme event occurring, an increase in the exposure of the community, or combination of the two.

Assign a High, Medium or Low rating for the Growth criteria using the Low, Medium, High descriptions below.

## Rate Growth

**Low:** Risk increases from EITHER increase in the probability of an extreme event occurring or and increase in the exposure of the community.

**Moderate:** Risk increases from BOTH increases in the probability of an extreme event occurring and increase in the exposure of the community at a LOW MODERATE RATE.

**High:** Risk increases from BOTH increase in the probability of an extreme event occurring and an increase in the exposure of the community at a HIGH RATE.

### Note of Caution – Difficulties with Prioritising Hazards

There are several difficulties associated with assigning a High, Medium, or Low rating to each of these criteria:

- The seriousness rating assigned to a given hazard depends upon the magnitude of the hazard event under consideration.
- There is a lack of quantitative data that can be utilized to compare hazard against hazard.

The severity and consequences of a hazard is variable and depends upon the magnitude and location of an event. In order to rate a specific type of hazard, scenarios will be developed to provide a threshold of for assessing the consequences of a given hazard event and therefore Prioritising hazard against hazard. As far as possible, these scenarios have been based upon severe events that are on the threshold of causing major disruption. For example, the seriousness of a flood event may be described as for a 1:100 year flood; the seriousness of an earthquake may be based on MM9 event (430 year return period). An earthquake of this return period has a magnitude that is around, or slightly in excess of earthquake code standards. Due to a lack of quantitative data, many of the hazard consequences or risks described will be qualitative, which may colour the prioritisation process.

### Table of SMUG Results

	<b>S</b>	<b>M</b>	<b>U</b>	<b>G</b>	<b>Tot</b>
<b>Tsunami – local</b>	<b>3</b>	<b>7</b>	<b>2</b>	<b>3</b>	<b>15</b>
<b>Utility failure – Communications</b>	<b>3</b>	<b>6</b>	<b>3</b>	<b>3</b>	<b>15</b>
<b>Transportation – Air</b>	<b>3</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>14</b>
<b>Flooding</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>13</b>
<b>Wind Storm</b>	<b>3</b>	<b>5</b>	<b>3</b>	<b>2</b>	<b>13</b>
<b>Fire – Rural</b>	<b>1</b>	<b>8</b>	<b>2</b>	<b>2</b>	<b>13</b>
<b>Public Health Emergency</b>	<b>3</b>	<b>5</b>	<b>2</b>	<b>2</b>	<b>12</b>
<b>Tsunami – Distant</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>12</b>
<b>Utility failure – Power</b>	<b>2</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>12</b>
<b>Erosion</b>	<b>2</b>	<b>5</b>	<b>2</b>	<b>2</b>	<b>11</b>
<b>Transportation – Marine</b>	<b>2</b>	<b>5</b>	<b>2</b>	<b>2</b>	<b>11</b>
<b>Bio-security Emergency</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>10</b>
<b>Earthquake</b>	<b>1</b>	<b>5</b>	<b>2</b>	<b>1</b>	<b>9</b>
<b>Storm Surge</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>9</b>
<b>Hazards Substances</b>	<b>1</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>9</b>
<b>Transportation – Road</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>8</b>
<b>Utility failure – Water</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>7</b>
<b>Fire – Urban</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>7</b>
<b>Criminal Damage</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>6</b>
<b>Civil unrest</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>6</b>