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# INTRODUCTION

***Insert Council introduction to the climate change project here.***

* ***Why this is being undertaken and who is involved.***
* ***Councils should note any support / existing commitments from Council or Council’s General Manager that underpin the action planning process (i.e. give further credibility/ persuasiveness).***

## Workshop objectives

***Insert workshop objectives here.***

***Workshop objectives should be adapted from the module 3 and 4 objectives below:***

* Identify potential risks to Council service areas as a result of climate change
* Analyse risk statements to determine preliminary level of risk
* Evaluate risks to develop a list of priority risk statements
* Identify adaptation actions through literature review and brainstorming
* Re-analysis of risk statements to determine effectiveness of adaptation actions
* Prioritisation of adaptation actions using risk management effectiveness and multi criteria analysis

***Note: councils should amend the objectives as necessary if external stakeholders such as community members are be involved.***

## Scope

***Define the scope of the risk assessment including the operational activities to be covered by the risk assessment (i.e. everything Council does or a specific subset of its activities), geographic boundaries and the time horizon.***

***It is recommended that the entire scope of Council’s operations be addressed in one assessment exercise if possible.***

## Stakeholders

***Determine which stakeholders need to be consulted to take their views into account, which stakeholders should be involved in the analysis and who should be informed of the outcomes of the risk assessment and action planning process.***

# BACKGROUND TO CLIMATE CHANGE

## Climate variability versus climate change

***Include some information on climate variability versus climate change. An example is provided below; however this should be adapted as the science improves.***

*Climate* simply refers to the average weather conditions for a specific place (usually averaged over 30 years). Climatic descriptions include both long term means and an expected range of variability. The difference between climate and weather is usefully summarised by the popular phrase "*climate is what you expect, weather is what you get*.”

Climate variability represents the ‘normal’ day to day, seasonal and yearly variability in the components of climate (e.g. temperature, rainfall). Climate variability can generate extreme conditions such as flooding, heatwaves and hail, which require management. Councils generally have practices and strategies in place to deal with routine climate variability.

Climate change is likely to bring about changes in both average climate conditions and the frequency and severity of extreme events, rather than causing completely new climate-related risks. This progressive change has implications for sea levels, ocean temperatures and the functionality of natural ecosystems. Climate change also means that councils can no longer rely on prevailing assumptions that climate will be more or less the same as it was over the past 50 or 100 years. It is important to note that climate change is expected to occur slowly, but the effects are likely to be far reaching and extremely difficult to reverse.

## Evidence base to support climate change

***Include some information on the evidence base to support climate change. An example is provided below; however this should be adapted as the science improves.***

The Intergovernmental Panel on Climate Change (IPCC) is a scientific intergovernmental body set up by the World Meteorological Organisation and by the United Nations Environment Programme. It was established to provide decision-makers and others interested in climate change with an objective source of information about climate change. It is made up of more than 1000 scientists worldwide.

The world’s leading climate scientists provide the following evidence in the IPCC Fourth Assessment Report (AR4) (2007):

* Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level;
* Observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases;
* Adaptive capacity needs to be improved everywhere; impacts of recent hurricanes and heatwaves show that even high-income countries are not well prepared to cope with extreme weather events;
* Climate-change vulnerabilities of industry, settlement and society are mainly related to extreme weather events rather than to gradual climate change;
* Coasts are experiencing the adverse consequences of hazards related to climate and sea level;
* Coasts will be exposed to increasing risks, including coastal erosion, over coming decades due to climate change and sea-level rise; and
* During the course of this century the resilience of many ecosystems (i.e. their ability to adapt naturally) is likely to be exceeded by an unprecedented combination of change in climate, associated disturbances (e.g. flooding, drought, bushfire, insects, ocean acidification) and in other global change drivers (especially land-use change, pollution and over-exploitation of resources), if greenhouse gas emissions and other changes continue at or above current rates.

## Observed climate change in Australia

***Include some information on climate change in Australia based on the information provided in the guidelines. An example is provided below; however this should be adapted as the science improves.***

There is a wide body of evidence available to suggest that Australia’s climate has already changed significantly, particularly over the last 50 years. Some of the key changes identified by CSIRO and the Bureau of Meteorology (2007) are listed below.

Oceans

* Global sea levels rose by about 17 cm during the 20th century;
* Australian sea levels rose by 10 cm between 1920-2000; and
* Substantial warming has occurred in the three oceans surrounding Australia, particularly off the south-east coast and in the Indian Ocean.

Temperature

* Average Australian temperatures have increased 0.9°C since 1950; and
* There are now more heatwaves and fewer frosts.

Rainfall

* Rainfall has declined substantially across most of eastern and south-western Australia since 1950;
* Variability in extreme daily rainfall intensity and frequency has increased in north-western Australia and over the western tablelands of New South Wales; and
* Rainfall intensity and frequency has decreased in the south-east, the south-west and along the central east coast of Australia.

## Projections of climate change

***Include some information on future climate change in projection based on the information provided in the guidelines. An example is provided below; however this should be adapted as the science improves.***

# ASSESSING CLIMATE RISK

## Climate scenarios

***Include information on one or two climate scenarios from module 2.***

### Projected changes in climate variables

***Outline the projected changes in climate variables for your Local Government Area (LGA) or region. This information should come from module 2.***

## Potential impacts

***Outline some potential impacts from the projected changes in climate variables for your LGA. This information should come from module 2.***

## Workshop process

### Identify the risks

The identification of risks will consist of developing a number of risk statements through a brainstorming session which investigates the effects of the climate change impacts specified earlier in this paper. Each risk statement should be developed as a cause-effect statement which describes what may happen to specific services and assets as a result of climate change impacts. Examples of “risk statements” could include:

* “*Increased brownouts will disrupt services at community centres”*;
* *“Increased storm surges will damage Council’s coastal infrastructure resulting in increased maintenance costs to Council”*.

At the workshop the development of risk statements will be explained.

### Analyse and evaluate the risks

Each risk statement will be analysed by determining its likelihood and consequence. The methods used will be consistent with AS/NZS ISO 31000:2009, and are adapted from the Commonwealth Government’s *Climate Change Impacts and Risk Management – A Guide for Business and Government.* Council is using the risk management framework (including likelihood and consequence matrices) outlined in the Commonwealth guidelines to analyse and evaluate risks[[1]](#footnote-1).

Likelihood of each risk statement will be determined using the following table.

Table 1: Example likelihood scales (AGO, 2006)

|  |  |  |
| --- | --- | --- |
| ***Likelihood rating*** | ***Recurrent Risks*** | ***Single Events*** |
| Almost Certain | Could occur several times per year | More likely than not – probability of occurring greater than 50% |
| Likely | May arise about once per year | As likely as not – 50/50 chance |
| Possible | May arise once in 10 years | Less likely than not but still appreciable – Probability less than 50% but still quite high |
| Unlikely | May arise once in 10 years to 25 years | Unlikely but not negligible – Probability low but noticeably greater than zero |
| Rare | Unlikely during the next 25 years | Negligible – probability very small, close to zero |

Determining the consequence of risk statements can be more complex than determining their likelihood. Risk consequences will vary depending on how risks impact council assets and specific service level objectives (success criteria) set by the Council.

Table 3 provides the risk-consequence matrix and success criteria contained within the Commonwealth guidelines.

Table : Example consequence scales and success criteria for a local Council (AGO, 2006)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ***Rating*** | ***Success Criteria*** | | | | | | |
|  | **Public Safety** | **Local economy and growth** | **Community and lifestyle** | **Environment and sustainability** | **Public administration** | **Other success criteria** |
| **Catastrophic** | Large number of injury or loss of life | Regional decline leading to widespread business failure, loss of employment and hardship | The region would be seen as very unattractive, moribund and unable to support its community | Major widespread loss of environmental amenity and progressive irrecoverable environmental damage | Public administration would fall into decay and cease to be effective | A level that would constitute a complete failure |
| **Major** | Isolated instances of serious injury or loss of life | Regional stagnation such that businesses are unable to thrive and employment does not keep pace with population growth | Severe and widespread decline in services and quality of life within the community | Severe loss of environmental amenity and a danger of continuing environmental damage | Public administration would struggle to remain effective and would be seen to be in danger of failing completely | A level that would constitute a major problem close to complete failure |
| **Moderate** | Small number of injury | Significant general reduction in economic performance relative to current forecasts | General appreciable decline in services | Isolated but significant instances of environmental damage that might be reversed with intensive efforts | Public administration would be under pressure on several fronts | A significant issue which may be reversed with major efforts |
| **Minor** | Serious near misses or minor injuries | Individually significant but isolated areas of reduction in economic performance relative to current forecasts | Isolated but noticeable examples of decline in services | Minor instances of environmental damage that could be reversed | Isolated instances of public administration being under severe pressure | No significant harm, but should be considered to prevent further escalation |
| **Insignificant** | Appearance of a threat but no actual harm | Minor shortfall relative to current forecasts | There would be minor areas in which the region was unable to maintain its current services | No environmental damage | There would be minor instances of public administration being under more than usual stress but it could be managed | A level that would attract no additional attention or resources |

Risk statements should be specifically developed so they can be assigned consequences based on the success criteria defined for Council. Analysis of risks should also take into account any existing factors which are in place to control the risk. This may include existing capital works which have already been allocated funding by Council.

Once qualitative likelihood and consequence ratings have been assigned to each risk statement, the final risk evaluation (prioritisation) can be completed (see Table 3).

The priority levels in Table 3 can be interpreted as follows:

* ***Extreme*** priority risks demand urgent attention at the most senior level and can not be simply accepted as a part of routine operations without executive sanction.
* ***High*** priority risks are the most severe that can be accepted as a part of routine operations without executive sanction but they will be the responsibility of the most senior operational management
* ***Medium*** priority risks can be expected to form part of routine operations but they will be explicitly assigned to relevant managers for action and maintained under review
* ***Low*** priority risk will be maintained under review but it is expected that existing controls will be sufficient.

The main objective of the risk evaluation stage of the workshop is to ensure that priority ratings are consistent. The final step in the workshop will involve reviewing and adjusting the risk assessment to ensure the final evaluation accurately reflects the relative risks of different climate impacts.

Table : Matrix of likelihood and consequence for prioritisation of risks (AGO, 2006)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Likelihood*** | ***Consequence*** | | | | | |
|  | ***Insignificant*** | ***Minor*** | ***Moderate*** | ***Major*** | ***Catastrophic*** |
| ***Almost Certain*** | Medium | Medium | High | Extreme | Extreme |
| ***Likely*** | Low | Medium | High | High | Extreme |
| ***Possible*** | Low | Medium | Medium | High | High |
| ***Unlikely*** | Low | Low | Medium | Medium | Medium |
| ***Rare*** | Low | Low | Low | Low | Medium |

# REFERENCES

***Insert any references used***

Australian Greenhouse Office, 2006, *Climate Change Impacts and Risk Management – A Guide for Business and Government.*

AS/NZS ISO 31000:2009 *Risk Management – Principles and guidelines*.

CSIRO, Australian Bureau of Meteorology, 2007, *Climate change in Australia: technical report 2007.*

IPCC, 2007, *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland.

1. Note that Council should amend this section if using Council’s risk assessment framework. [↑](#footnote-ref-1)