The Flinders Ranges Council

# COMMUNITY EMERGENCY RISK MANAGEMENT PLAN 2014

Jarvis Hill Lookout, Hawker

Version 2.1
27 May 2014

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## EXECUTIVE SUMMARY

This ISO 31000 compliant Community Emergency Risk Management Plan (CERM) examines and evaluates the risks of a comprehensive range of hazards to the community encapsulated by the borders of The Flinders Ranges Council. Whilst applying compliant methodology, it establishes the Emergency Management context of the community. It sets the objectives and narrows the scope of the risk assessments. It also argues for the inclusion of lack of water or drought as a clear and present danger to the community, while providing historical and scientific evidence. This plan should be read in conjunction with the Council Business Continuity Plan.

It identifies key stakeholders. Risk management studies are then recorded in compliance with the National Emergency Risk Assessment Guidelines (NERAG), analysed and evaluated. Of the 12 threats assessed and analysed, 7 key threats were identified. These are:

1. Drought
2. Bushfire/wildfire
3. Flood
4. Animal/Bird/Insect Plague
5. Earthquake
6. Extreme Weather/Storms/Heatwave (Including dust storms)
7. Transport disaster

These key threats require the most attention in terms of planning, preparation, prevention and mitigation.

The Flinders Ranges Council, resolved to form a Community Emergency Risk Management reference committee. This reference committee will review this CERM plan, adding their collective assessments and intelligence within the context of NERAG. This step of The Flinders Ranges Council is a step towards international and national best practice, in emergency management preparation, planning, prevention and mitigation.

The annexure provide examples of NERAG risk criteria, matrices and tables used in assessments.

**As a general rule, in preparation for disaster events, and to ease the application process of submissions to the Local Government Development Fund, Council has determined to document and photograph all key Council assets at risk of any kind of damage from disaster events.**

# PRELIMINARY

## ENDORSEMENT, APPROVAL AND REVIEW OF PLAN

**This Community Emergency Risk Management (CERM) plan has been endorsed and approved for use by:**

_____(Sign)
Colin Davies
Chief Executive Officer, The Flinders Ranges Council

Date _____

_____(Sign)
Peter Slattery,
Mayor, The Flinders Ranges Council

Date _____

**Table A: Document Distribution**

| | |
|---|---|
| **Document Name:** | **The Flinders Ranges Council Community Emergency Risk Management Plan** |
| **Document Status:** | Draft |
| **Version Number:** | 2.1 |
| **Reviewed by:** | Patricia Flood & Council Staff |
| **Authorised By** | Colin Davies |
| **Distribution:** | CERM Committee |
| **Mayor** | Peter Slattery |
| **Deputy Mayor** | John Shute |
| **Councillors** | K Anderson, R Daniel, B Filsell, G Lucas, G Thompson |
| **Chief Executive Officer** | Colin Davies |
| **Works Manager** | Roy O'Connor |

**This Plan is to be reviewed bi-annually**

**Table B: Plan Version Control**

| Version | Date | Author | File | Comments |
|---|---|---|---|---|
| 1.0 | 16/02/2012 | Stuart Mawbey | 18.75.1 | Initial framework |
| 1.1 | 08/08/2012 | Stuart Mawbey | 18.75.1 | Submission to Council |
| 1.2 | 04/10/2012 | Stuart Mawbey | 18.75.1 | Submission to Council |
| 1.3 | 08/11/2012 | Colin Davies | 18.75.1 | Adopted by Council |
| 2.0 | 15/04/2014 | Patricia Flood | 18.75.1 | Draft review |
| 2.1 | 10/06/2014 | Patricia Flood | 18.75.1 | Submission to Council |
| 2.2 | | Colin Davies | 18.75.1 | Adopted by Council |

## FEDERAL AND STATE LEGISLATIVE AND POLICY CONTEXT

Local Councils participation in emergency management is founded on specific legislative framework provided in the following South Australian legislation:

- Local Government Act, 1999
- Emergency Management Act, 2004
- Fire and Emergency Services Act, 2005

**South Australian Local Government participation is also outlined in the:**

- State Emergency Management Plan Version 2.10, 2013

**Other relevant SA legislation**

- Public Health Act , 2011
- SA Work Health and Safety Act, 2012

## METHODOLOGY

The Australian/New Zealand Standard *AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines,* process has been used to produce the plan (AS/NZS ISO, 2009). Contextualised within this document are the principles of the *National Emergency Risk Assessment Guidelines* (NERAG). The process model is depicted in the following diagram which is taken from NERAG (National Emergency Management Committee, 2010) [A].

Figure 1 shows the methodology of this CERM derived from NERAG.

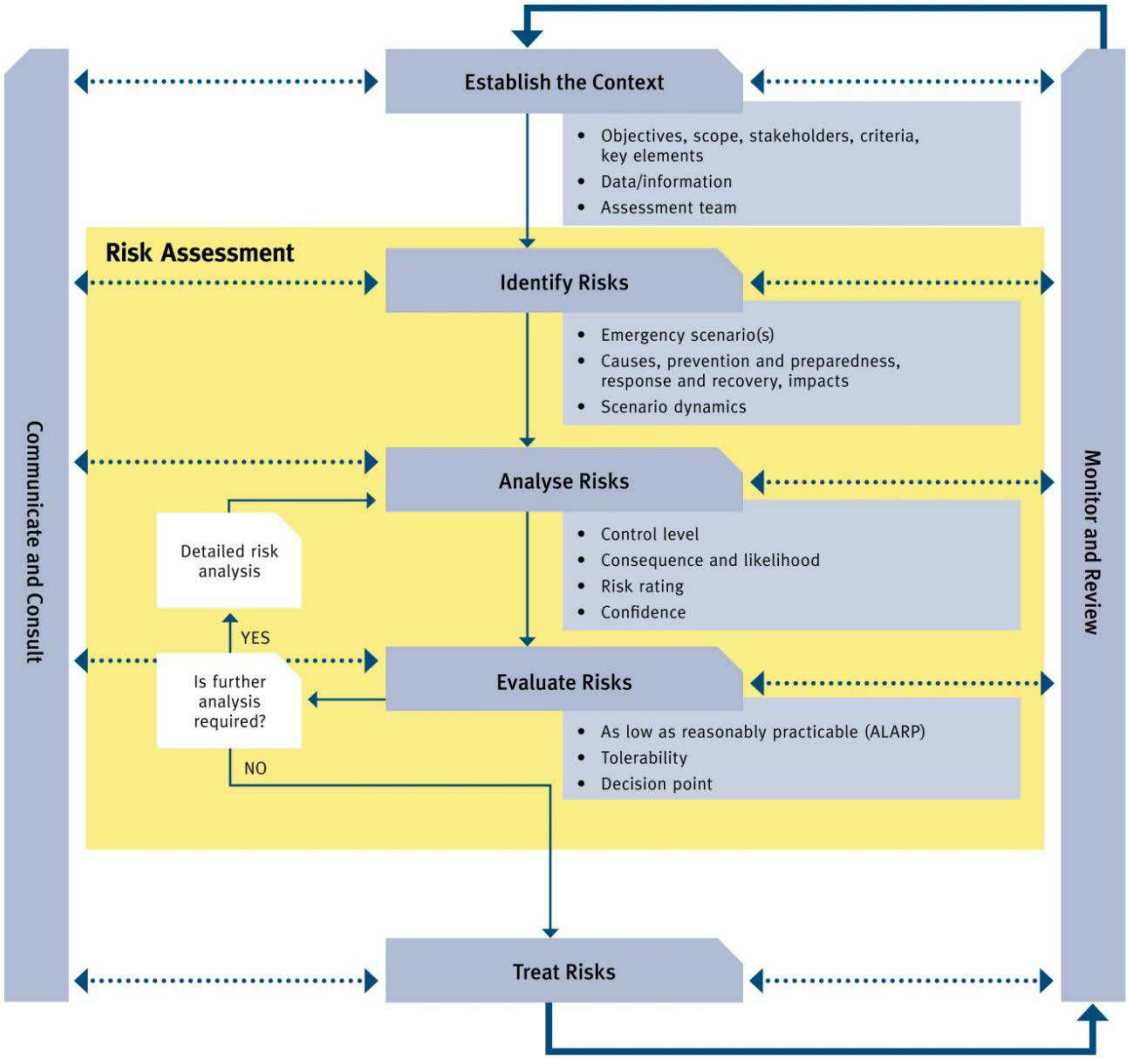



***Figure 1:*** Risk Assessment Methodology for Emergency Events

## ACKNOWLEDGEMENTS

The Flinders Ranges Council CERM plan has been developed to provide guidance and promote best practice emergency planning.

The following publications are acknowledged in the preparation of this plan:

- LGA, *Model Community Emergency Management Plan and Template*, (Local Government Association of South Australia, 2008)
- *AS / NZ ISO 3100 : 2009, National Emergency Risk Assessment Guidelines*,
- Peter Bell, *Heritage of the Upper North Region: Background History* in *Heritage of the Upper North*, Department of the Environment and Natural Resources, Adelaide, 2000

The contributions of following people are also acknowledged:

- Colin Davies — CEO
- Patricia Flood — Patricia Flood Consultancy
- Staff — The Flinders Ranges Council

**Definition of Council for this Plan**

From this point forward all reference to the word 'Council' shall mean
The Flinders Ranges Council unless otherwise indicated

## FUNDING

The original Council Community Emergency Risk Management (CERM) Plan was developed through funding by the:

- Commonwealth Government of Australia, Attorney General's Department, Emergency Management Australia (EMA);
- Government of South Australia, South Australian Fire and Emergency Services Commission (SAFECOM).

This review has been entirely financed by The Flinders Ranges Council.

COUNCIL CERM REFERENCE COMMITTEE

## ROLE AND FUNCTION OF THE CERM REFERENCE COMMITTEE

The CERM Reference Committee will be established to facilitate the process of reviewing and improving this CERM Plan.

Draft Terms of Reference for the CERM Reference Committee are summarised as follows:

- to be consulted, and help prepare the CERM Plan;
- to identify, analyse and evaluate risks and determine treatments to those risks that will reduce the severity and impact of disasters on the community;
- to promote community ownership of community emergency risk management planning;
- to create working relationships and linkages between neighbouring communities, neighbouring Local Governments and State agencies that will further develop measures to cope with emergencies;
- to provide comment on proposed local Council plans;
- to invite community members to attend meetings to discuss their specific issues and proposals that relate to the Council CERM Reference Committee for action;
- to co-opt community members to assist the Council CERM Reference Committee, in their deliberation of issues referred for action; and
- to liaise closely with the Far North Zone Emergency Management Committee (ZEMC)

### CERM REFERENCE COMMITTEE MEMBERSHIP

***Table C***

| Name | Organisation/Title |
|---|---|
| **Colin Davies** | Chief Executive Officer |
| **Roy O'Connor** | Works Manager |
| **TBA** | |
| **TBA** | |

The CERM Reference Committee membership is to be determined by Council, following a resolution by Council:

"*That The Flinders Ranges Council:*

a. *establish a Reference Committee of Council, to be known as the Community Emergency Risk Management Reference Committee with representation being sought from relevant stakeholders; and*
b. *the District Bushfire Prevention Committee be terminated*."

# ESTABLISH THE CONTEXT

## COUNCIL DESCRIPTION

Facts about the Council

- The area within the boundary of the Council is 4,128km$^2$
- The Council maintains approximately 1,263km of roads; 27km of which are sealed with the balance unsealed
- There are 1,565 rateable properties
- Council assets (current and non-current) in 2014 are worth $67.7 million
- The operating revenue of the Council in 2013 was $4.9 million
- Rate revenue of Council in 2013 was $1.3 million

**Note:** **> 3% of operating revenue of Council is > $147,000, representing a catastrophic financial loss.**
(NERAG AS/NZ ISO 31000:2009 pg 32)

Towns within the Council district are:

- Quorn
- Hawker
- Cradock

## GEOGRAPHY, ECOLOGY, GEOLOGY

As a Local Council gazetted by the Governor of the State of South Australia - a State within the Commonwealth of Australia – the Council is bordered to the south west by the City of Port Augusta, to the south by the District Councils of Mount Remarkable and Orroroo Carrieton, with the bulk of the Council border surrounded by the Outback Communities Authority.

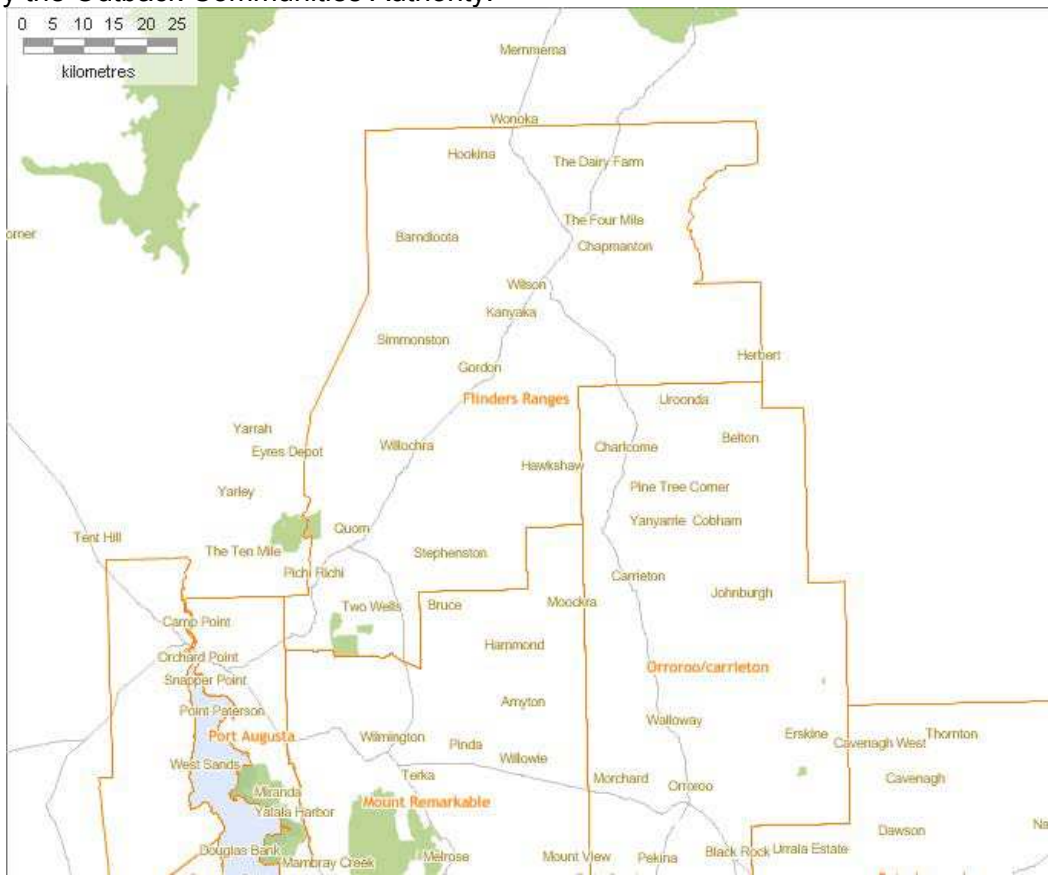



***Figure 2:*** **Maps showing The Flinders Ranges Council**
(Local Government Association of South Australia, 2012)


***Figure 3*** **Map showing approximate location of The Flinders Ranges Council in relation to the state and continent**

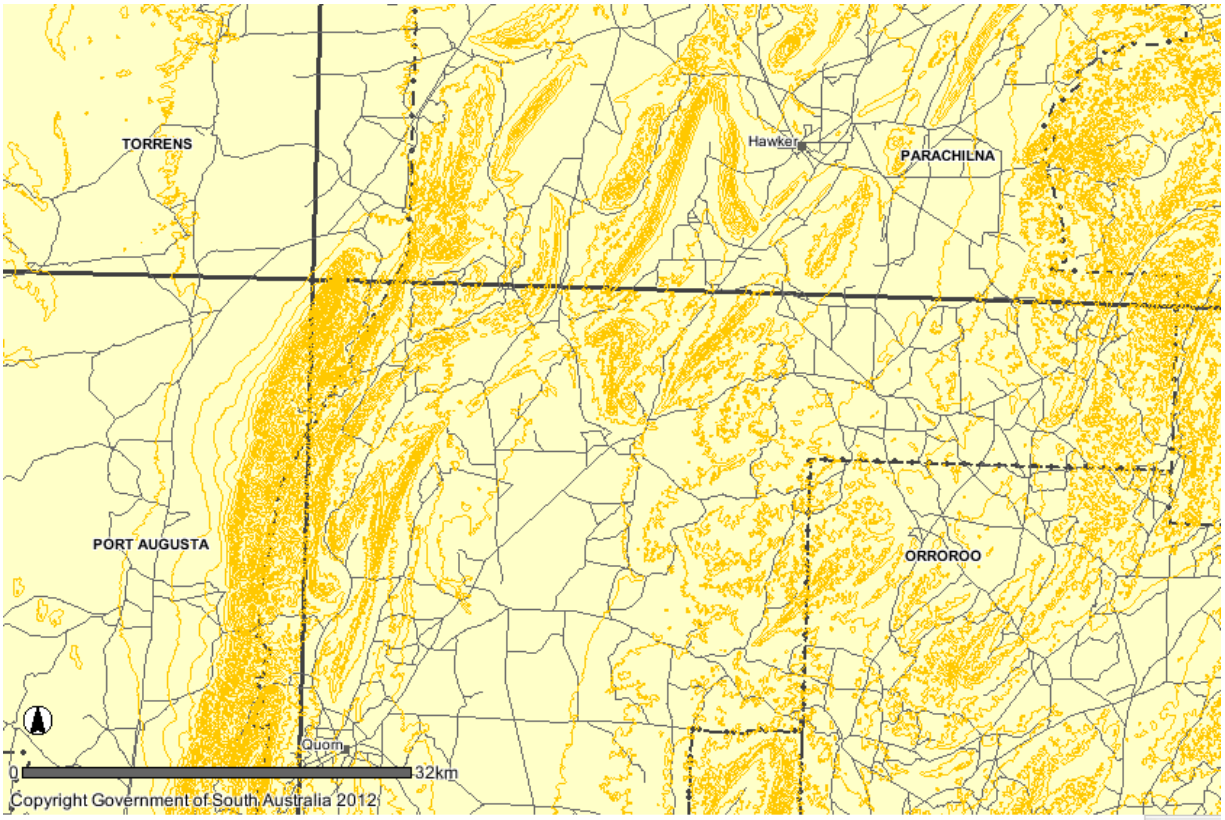



***Figure 4:*** **a topographical map centred on the Council area. Yellow lines indicate generalised 150 metre contours; grey lines are roads. Scale approximately 1: 450,000**.
(Government of South Australia, 2012)


***Figure 5:*** **shows a map with the marker A at Quorn, the Council administrative centre in relation to Hawker and Cradock, with relief terrain highlighted.**
(Google Maps, 2012)

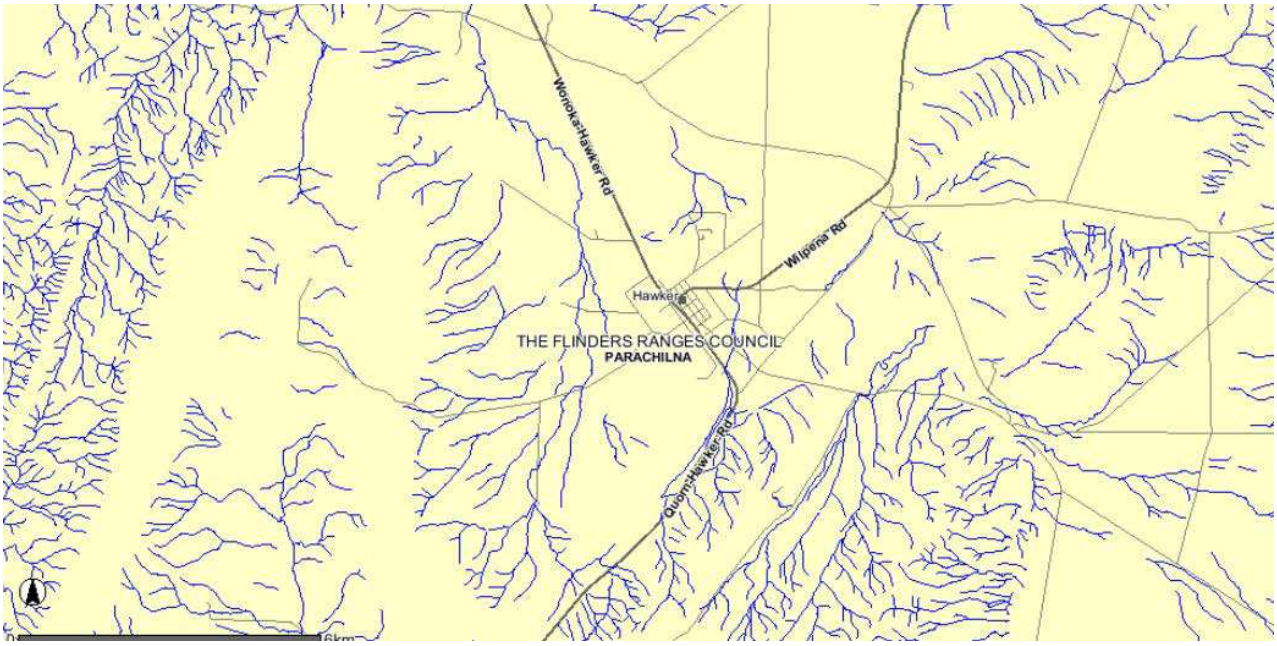



***Figure 6*: shows a map centred on Hawker, roads in grey, water courses in blue, scale approx 1: 99,999.**
(Government of South Australia, 2012)

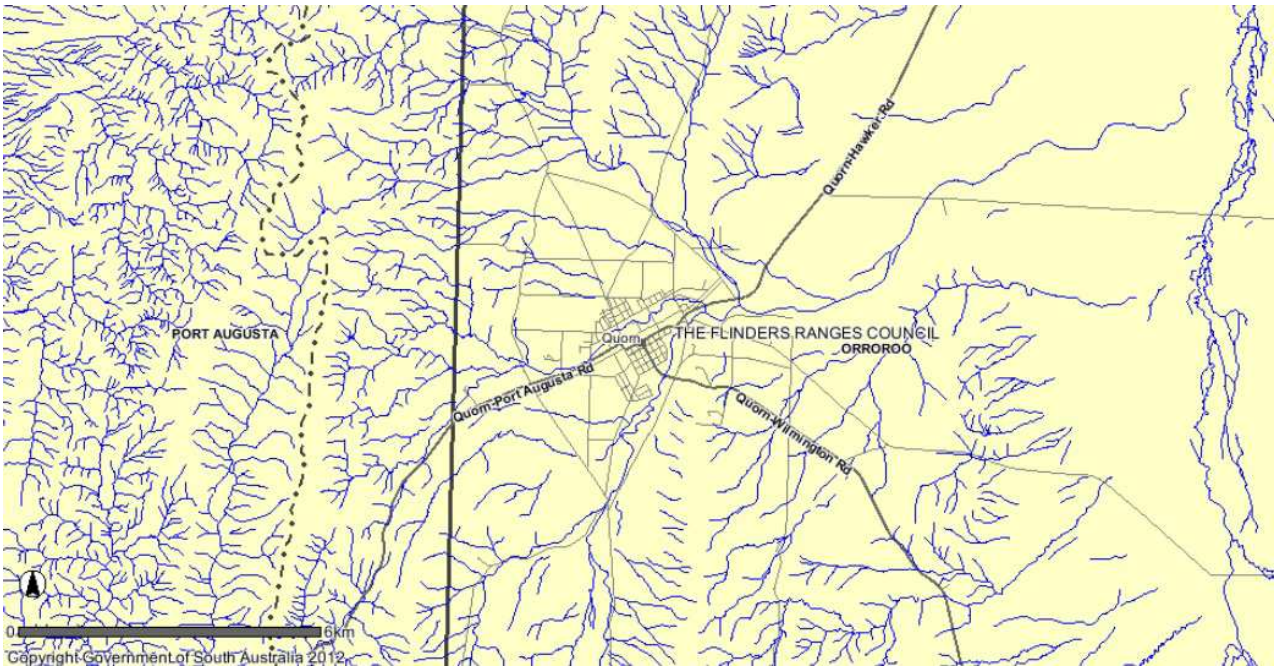



***Figure 7:* shows a map centred on Quorn, roads in grey, water courses in blue, scale approx 1:99,999.**
(Government of South Australia, 2012)

## GEOLOGY AND ECOLOGY

*The Flinders Ranges originate from a great thickness of sedimentary rocks deposited in the Adelaide Geosyncline through the Precambrian and Lower Cambrian periods some 1400 to 500 million years ago. These sediments have been folded, fractured, faulted, uplifted and denuded several times, most recently in Late Tertiary times. Differential erosion of the hard sandstones and quartzites which stand out as dominating ridges, and the softer slates and shales which form valleys and low hills….*

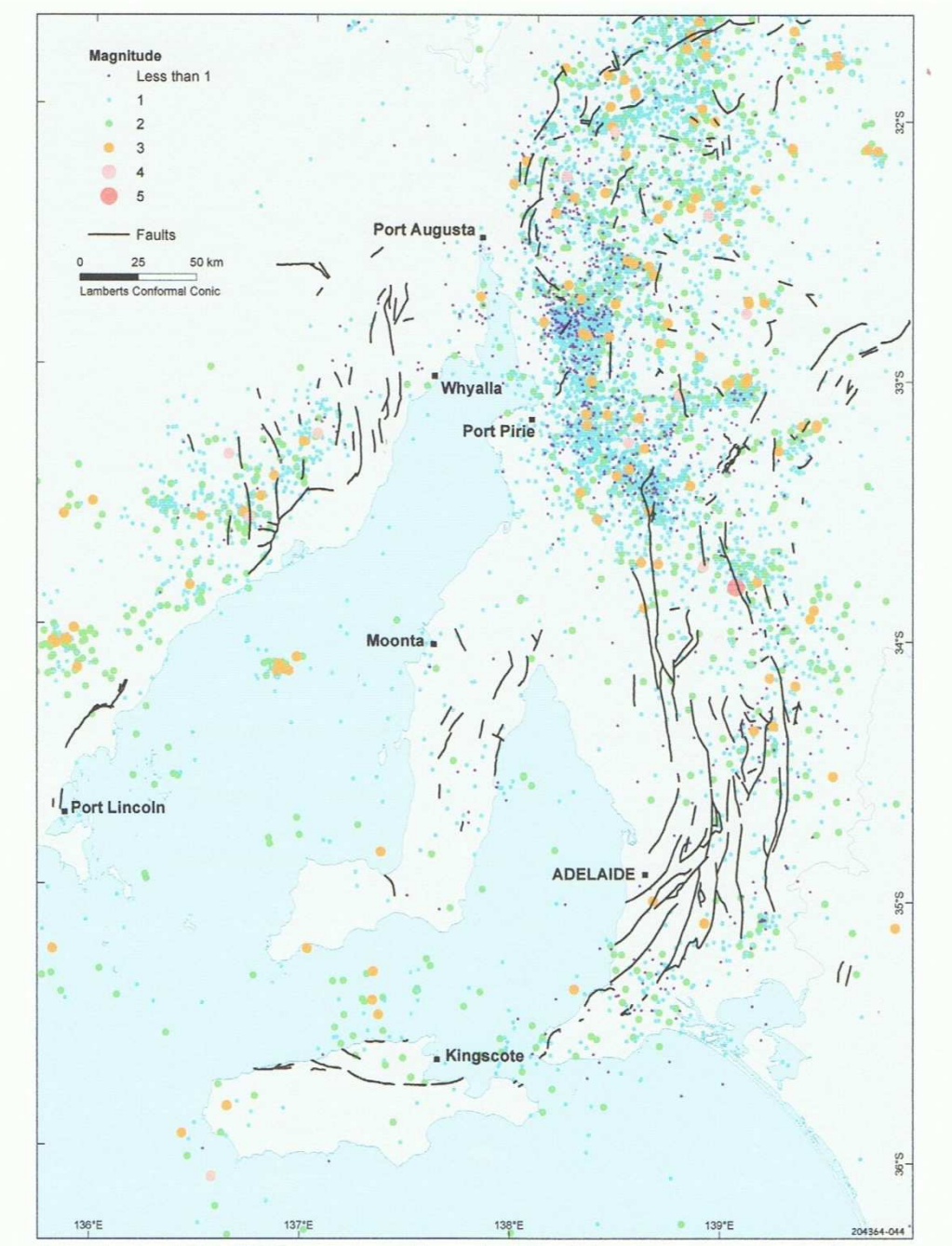
*There may be 250 mm of rain on the flats and basins and perhaps 350 mm or more on the crests of the ridges. Rain is infrequent but can be heavy at any season, causing the intermittent creeks to rise suddenly. Red gums grow in the watercourses, and the valleys between the ridges are often park-like with the native Callitris pine, acacias and casuarinas.*

*On the plains the native plant cover of bluebush, saltbush, spear grass and porcupine grass has been greatly modified by the pressure of grazing sheep and rabbits. Throughout the region there are many attractive native flowering plants as well as exotic invaders such as Salvation Jane. Together, these produce brilliant spring carpets of flowers on the lower lands in wet years."*

(www.atlas.sa.gov.au , 2004)

## EARTHQUAKES

*"From experience in the Flinders Ranges it would appear that the earthquakes are scattered widely and do not cluster along the faults. It is therefore considered that although the next major event may occur on a known fault line, there is also a very good probability that it will not."* (DMITRE 2014)




*Earthquakes from 1980 to 2013. Epicentres are widely spread and do not follow any narrow zones. Large earthquakes can occur anywhere.*

***Figure 8*: shows the location of fault lines in black as well as earthquakes**
(Government of SA, Department Manufacturing, Innovation, Trade, Resources and Energy 2013)

Although there is some risk associated with building near a fault line, it is not considered to be great. The construction and condition of the buildings are considered to be more important factors.
(Government of SA, Department Manufacturing, Innovation, Trade, Resources and Energy 2013)

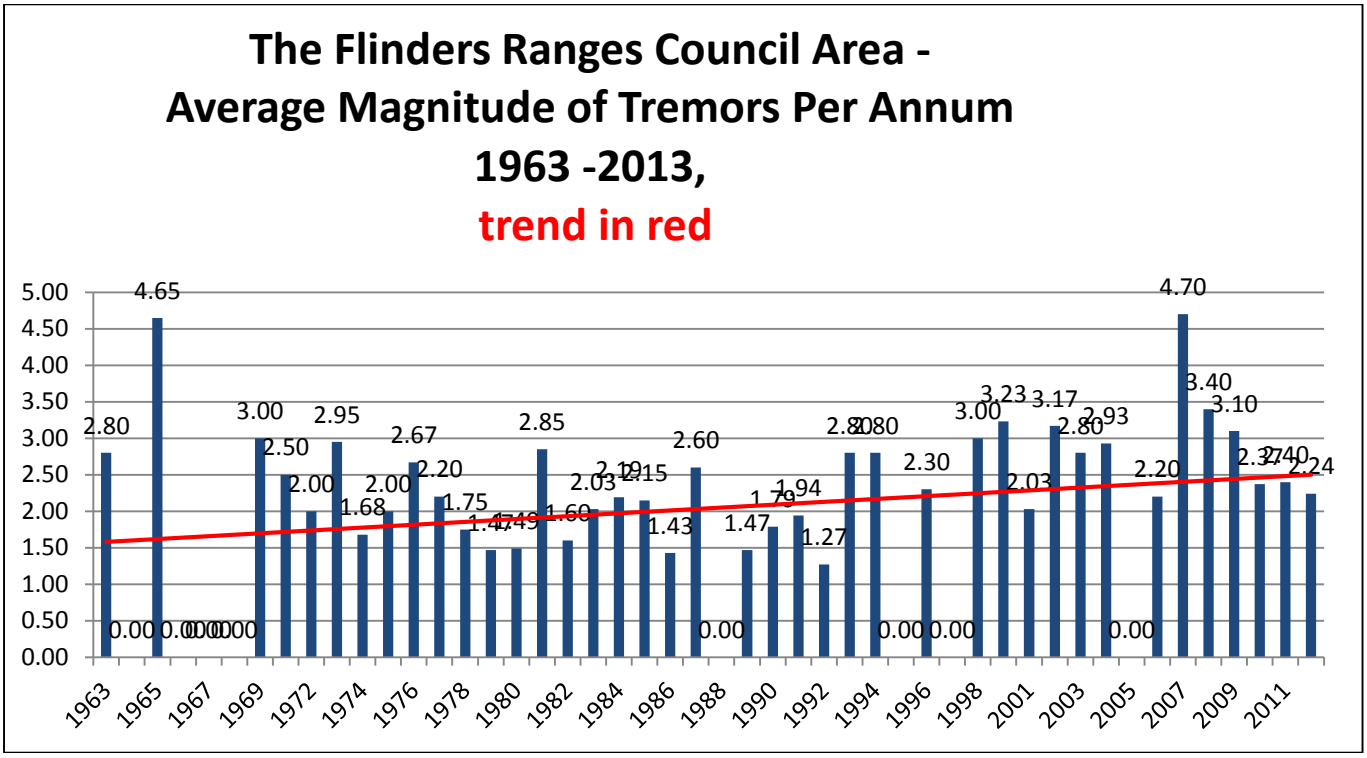



***Chart 1***

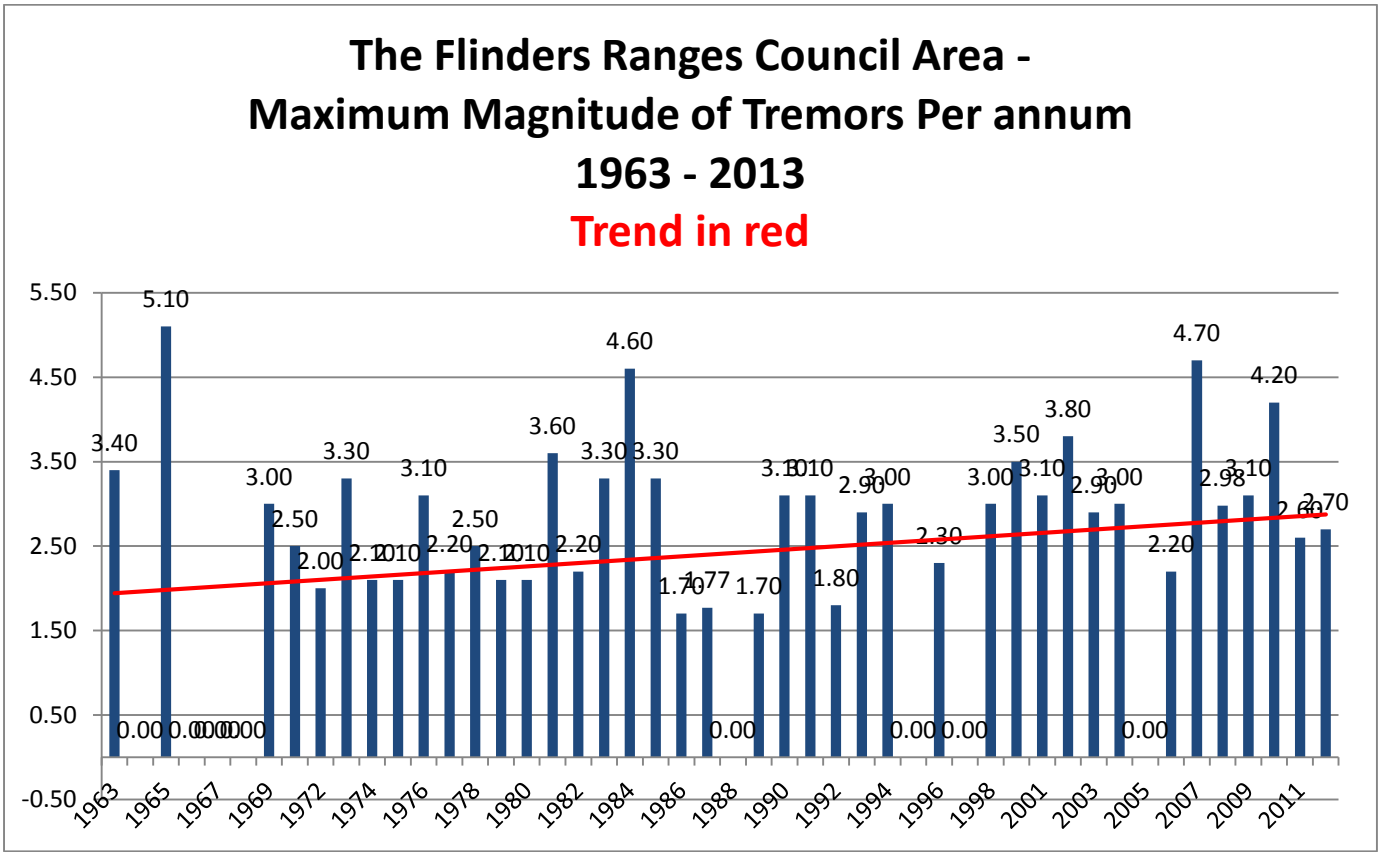



***Chart 2***

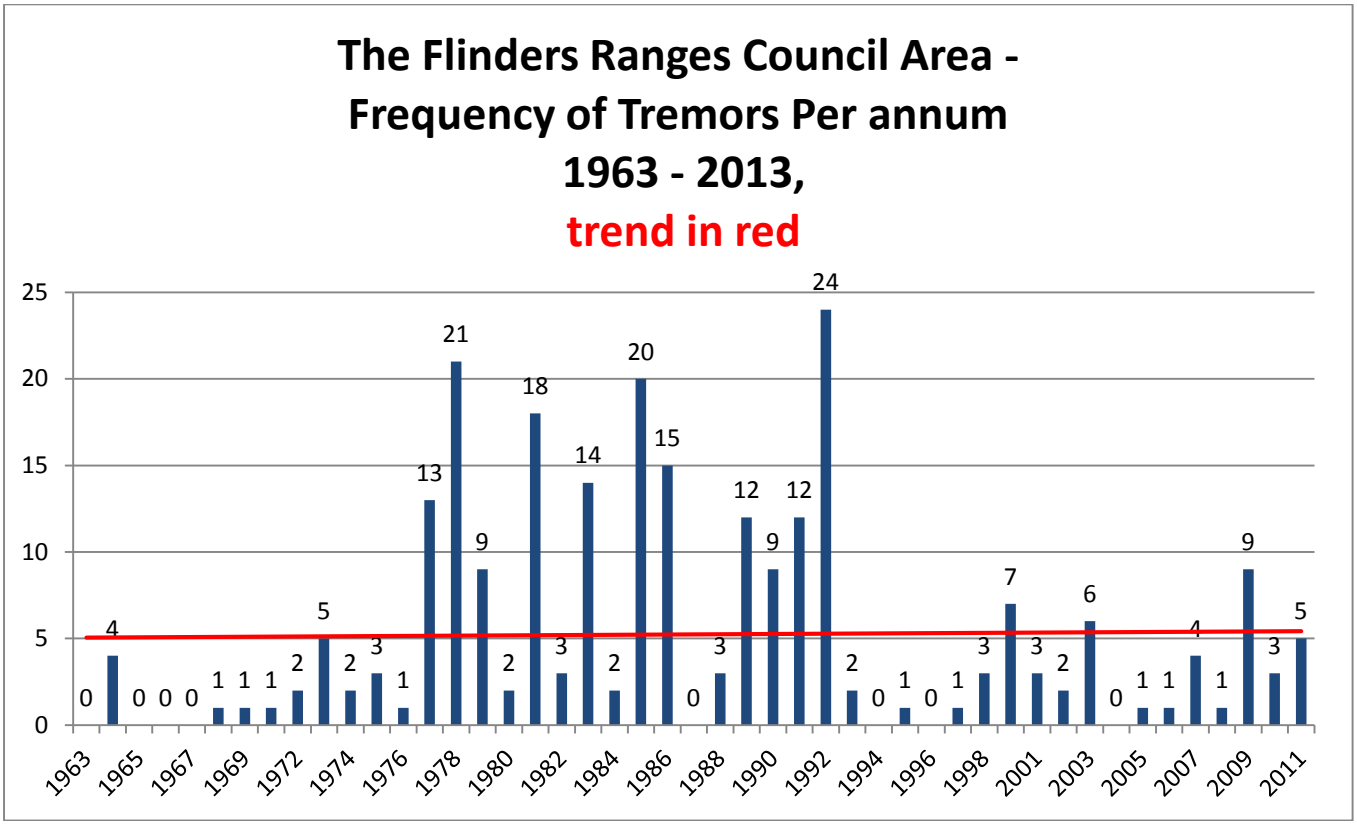



***Chart 3***

Charts 1, 2 and 3 are sourced from seismic data downloaded from GeoScience Australia. (Geoscience Australia, 2012) Google Earth mapping of seismic events over time, are also available with this resource.

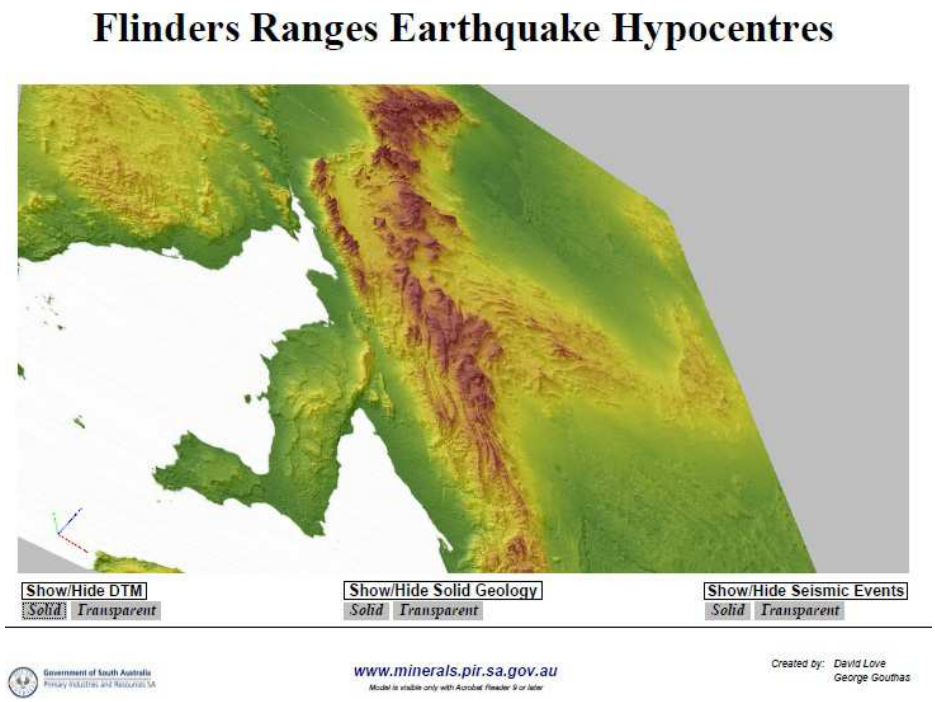



***Figure 9:*** **shows the solid geology of the Flinders Ranges, with Seismic events hidden**

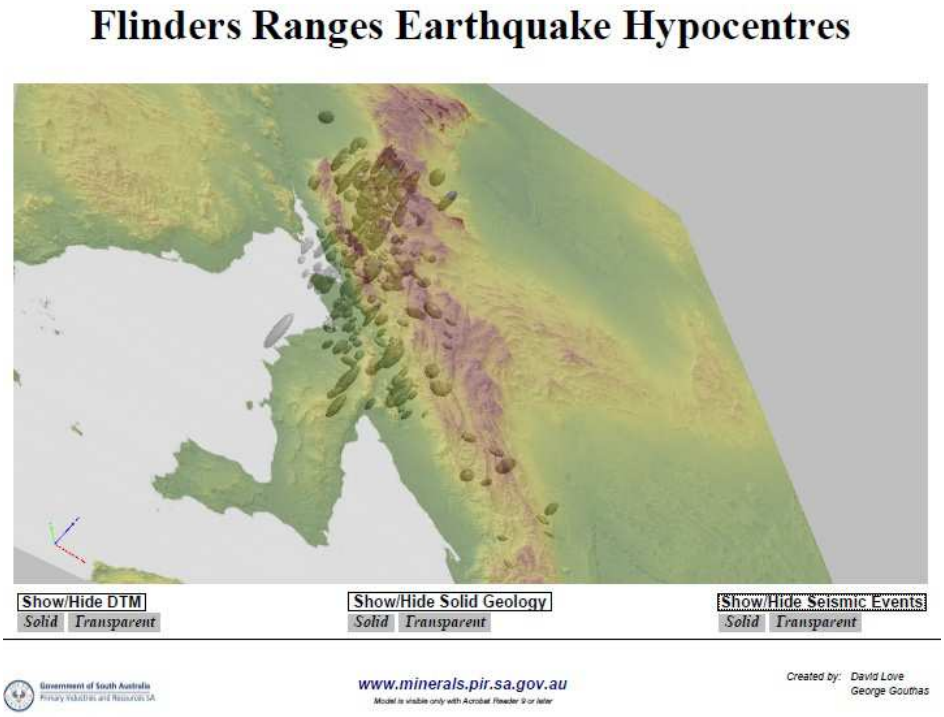



***Figure 10:*** **shows the geology as transparent, with Seismic events shown, contrast with Figure 9**
Source: (Love, D. & Gouthas, G., 2012)

## VULCANISM

According to recent research Australia's most recently active volcano is Mt. Schank, Maar type volcano (a low relief phreatomagmatic crater, combining in eruption, ground water and magma), 10 kilometres from Mt. Gambier approximately 620km South-South-East of Melrose, and was active about 5000 years ago. The Mt. Gambier Maar system, was at one stage thought to be active 4300 years ago, but was revised to 28,000 years ago, by later research. (Grimes, 2010).

The Australian hotspot volcanic plume responsible for the Mt. Gambier/Mt. Schank system is now between Victoria and Tasmania in the Bass Strait, and the Tasman Sea, at approximate latitude of $40^{O}$ south. (Geoscience Australia, 2002).

As there is a lack of scientifically validated research material, regarding volcanic eruption risk in Australia, it would be safe to assume, the risk is extremely low, from a likelihood level of less than almost incredible.

## CLIMATE AND WEATHER

The climate of the Council district is shown by the maps from Australian Bureau of Meteorology below:

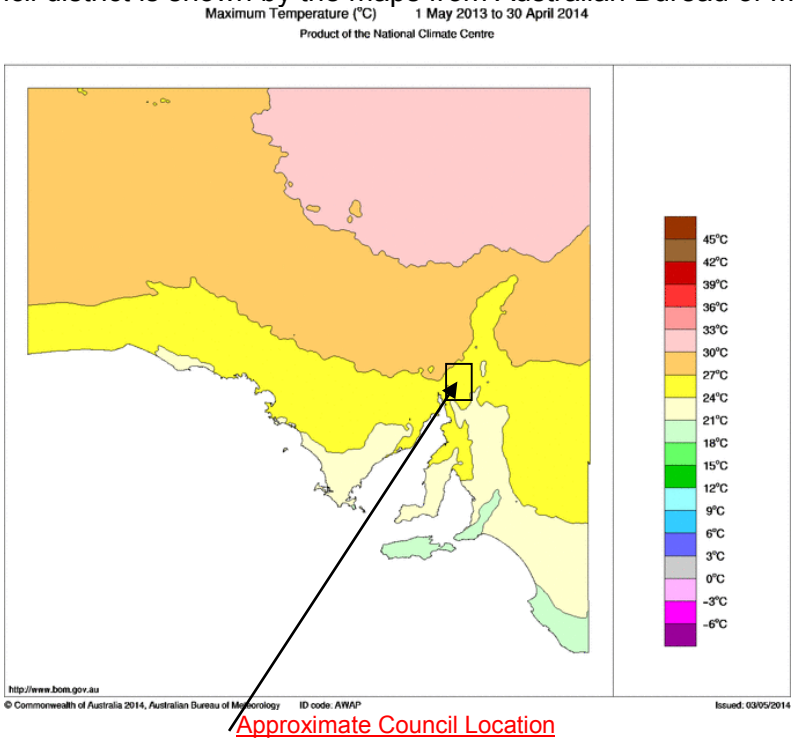



***Figure 11:*** **shows that the Council district had an Average Maximum Temperature variation between 24 and 27 degrees Celsius (BOM 2014)**

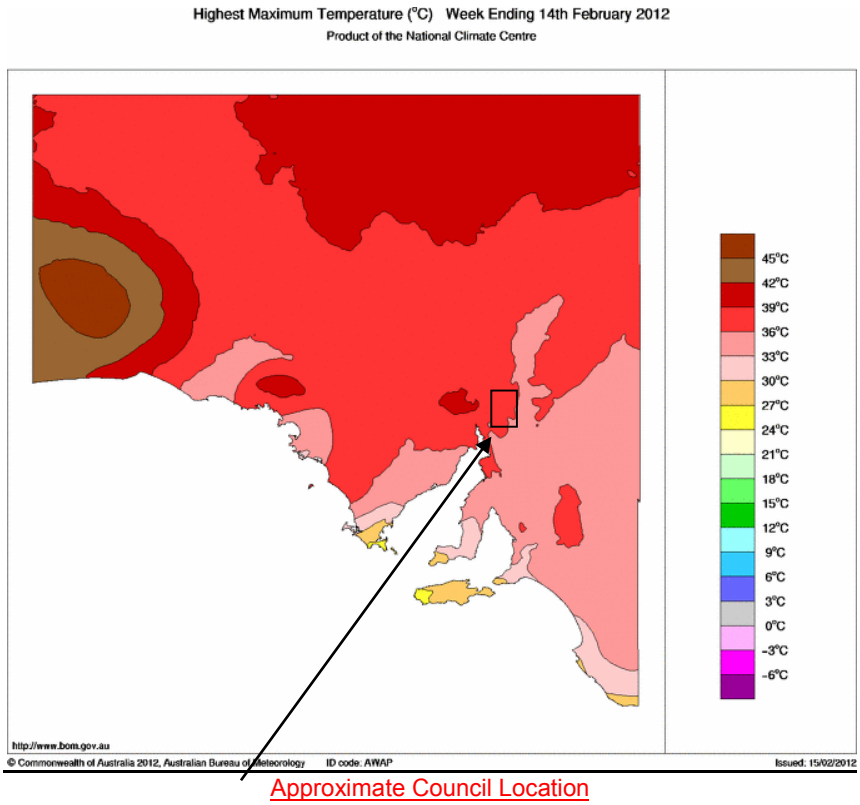



***Figure 12:*** **shows the highest maximum temperature over the last 12 months, the Council district displaying a temperature variation between 36 and 39 degree** (BOM 2014)

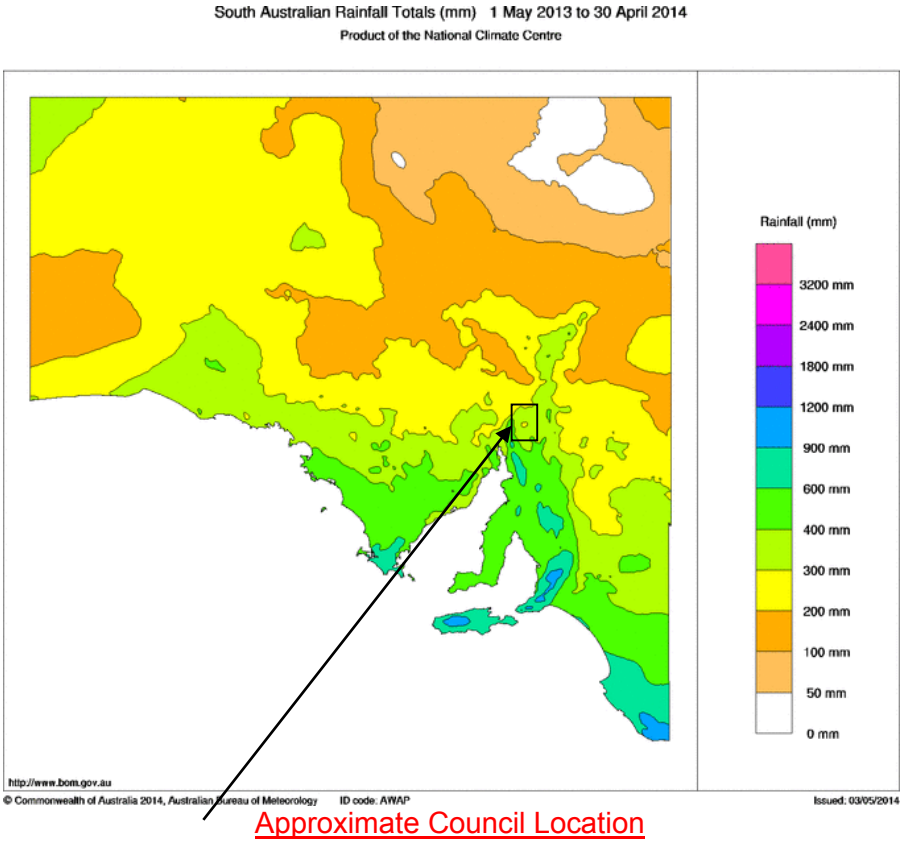



***Figure 13:*** **shows that in the Council district the average yearly rainfall for May 2013 to April 2014 varied between 300mm and 400mm** (BOM 2014)

## CLIMATE CHANGE

Climate change will have a significant impact on this Council, the Council, people, economy and environment all face many high risks associated with the change. (Balston, et al, 2011) Climate change also affects the delivery of Emergency Management in all aspects of PPRR. CSIRO asserts, based on empirical evidence, that the effect of human attributed climate change, from atmospheric carbon emissions, will increase the likelihood of increasingly variable weather, including droughts, floods, storms and heatwaves, (CSIRO, 2011) and (Balston, *et al*, 2011) concur.

In the context of emergency management (Balston, *et al* 2011) state that volunteers represent an effective means of managing intermittent emergency management needs. A possible result of the ageing population and other social alterations (brought about by sensitivity to climate change factors) would result in a reduced pool of potential volunteers.

This situation argues (Balston, *et al*), will result in the reallocation of responsibilities to agencies and other paid service providers, like local councils. Given however, that the social, economic and environmental factors leading to such a structural change occurs, it is likely that there will be reduced ratepayer and taxpayer base.

Further, a major town of the FSS district has been identified as South Australia's second highest at risk town, for climate change affects. This is based upon three main factors, measuring vulnerability which includes:

- Exposure
  - % change in mean surface temperature
  - % change in total rainfall
- Sensitivity
  - % of employed in agriculture
  - Remoteness
- Adaptive
  - % of total employed by highest year of school completed
  - % of employed by highest level of educational attainment, post grad, grad dip, and bachelor
  - Total population size

(Beer, 2012) Further Professor Beer's team adds:

*"The grains industry is potentially at risk because cereal crops are sensitive to the timing of frosts and because many wheat growing regions in southern Australia rely on winter-spring rainfall patterns that are predicted to decline over time..."*

Professor Beer and his co-authors use the (McMichael, A, 2009) report titled "Climate change in Australia: risks to human wellbeing and health". McMichael is a former president of the International Society of Environmental Epidemiology. The following table has been adapted from the McMichael report:

***Table D***

| Risk # | Epidemiological Risk Description |
|---|---|
| **1** | *"Increased illness events and deaths from more frequent and severe heatwaves, especially in urban environments Evidence from time-trends over recent decades points to an increase in the annual numbers of deaths in association with an uptrend in the annual number of very hot days. The heat associated death rate in persons aged over 65 years, in major cities, could increase by 2-to-4-fold by the latter half of this century – and probably more if future changes in weather variability are allowed for"* |
| **2** | *"Increased injury, death and post-traumatic stress disorders from increases in other extreme weather events – esp floods, storms, cyclones (moving further south), and more extreme bushfires."* |
| **3** | *"Increased risks of infectious food-poisoning (gastro-enteritis), from salmonella, campylobacter, various temperature sensitive vibrios, and others. "* |
| **4** | *"Changes in the range and seasonality of outbreaks of mosquito-borne infections – dengue fever in northern Australia (likely to spread south, down both eastern and western coasts), Ross River virus disease, Barmah Forest virus disease, and others"* |
| **5** | *"Fresh-water shortages in remote (especially indigenous) communities, with consequences for hygiene and sanitation"* |
| **6** | *"Regional increases in the production of various plant-derived aeroallergens (pollens, spores) that cause/exacerbate asthma."* |
| **7** | *"A potentially serious range of adverse health impacts of more severe droughts and long-term drying conditions on rural communities. These include adverse impacts on:*<br>• *Mental health (depression and suicides)*<br>• *Child emotional and developmental experiences*<br>• *Exposures to extremes of heat, dust, smoke*<br>• *Freshwater shortages and hygiene*<br>• *Local food availability*<br>• *Changes in health–related behaviours (e.g., alcohol, smoking, self-medication)"* |

From "*Climate change in Australia: risks to human wellbeing and health*" (McMichael, A, 2009) Self-medication is the self-administration of therapeutic drugs, without medical advice: it is sometimes referred to as drug abuse.

Although (Nichols, Butler, & Hanigan, 2006) in "**Inter-annual rainfall variations and suicide in New South Wales, Australia, 1964-2001**" found:

*"The suicide rate in New South Wales is shown to be related to annual precipitation, supporting a widespread and long-held assumption that drought in Australia increases the likelihood of suicide. The relationship, although statistically significant, is not especially strong and is confounded by strong, long-term variations in the suicide rate not related to precipitation variations. A decrease in precipitation of about 300 mm would lead to an increase in the suicide rate of approximately 8% of the long-term mean suicide rate."*

The (McMichael, A, 2009) report, says:

"*The severity and distribution of these mental health problems are also influenced by aspects of community – resources, cohesion, resilience, and external supports. There is a need to understand what determines the level of vulnerability of a community or region, and how this can be modulated by community cohesion and resilience (social capital)."*

For a 1 to 2 degree Celsius change in temperature (Beer, 2012) quotes from a (Preston, 2006) report which indicates the following affects to agriculture, as practiced in the FSS district.

- 12% change of decreased wheat production (without adaptation)
- 32% chance of wheat crop value below current level (without adaptation)
- 91% chance of wheat exports being below current level (without adaptation)
- $12.4 million/year to manage with southward spread of Queensland fruit fly
- 40% of core habitat lost for Eucalyptus
- 38% increase in tick-related losses in net cattle production weight

(Beer, 2012) *et al* notes while concluding with the section titled "**Policy Implications**"

"*Climate change adaptation for Australia's country towns will take place in an environment where many country towns are already challenged by declining terms of trade for commodity production, the apparently inexorable growth in average farm size, increased mechanisation, the use of external inputs in farm production and long term demographic decline."* It is clear, from the intention of the above reports, that the people of the district will be threatened by climate change implications, in more ways than one.

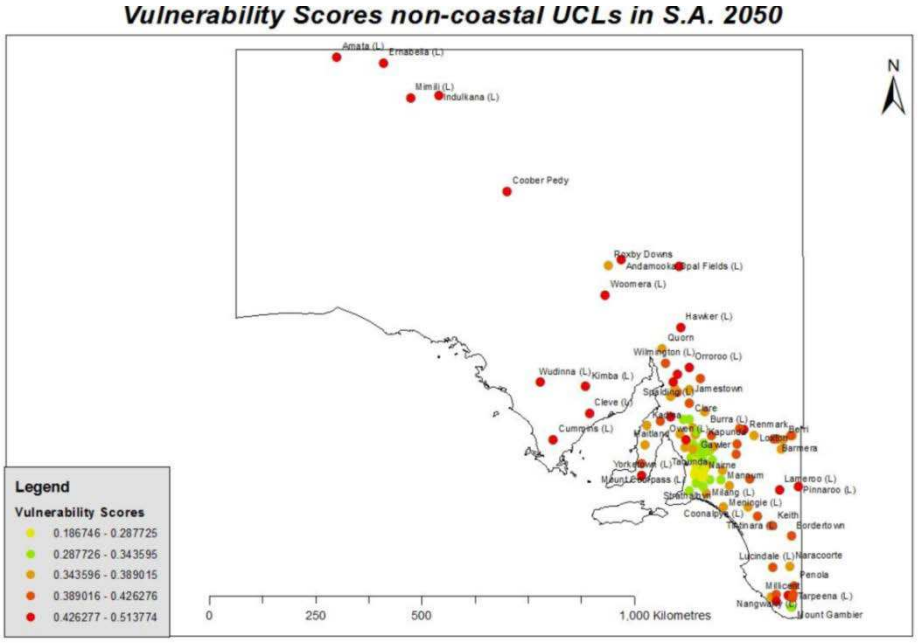
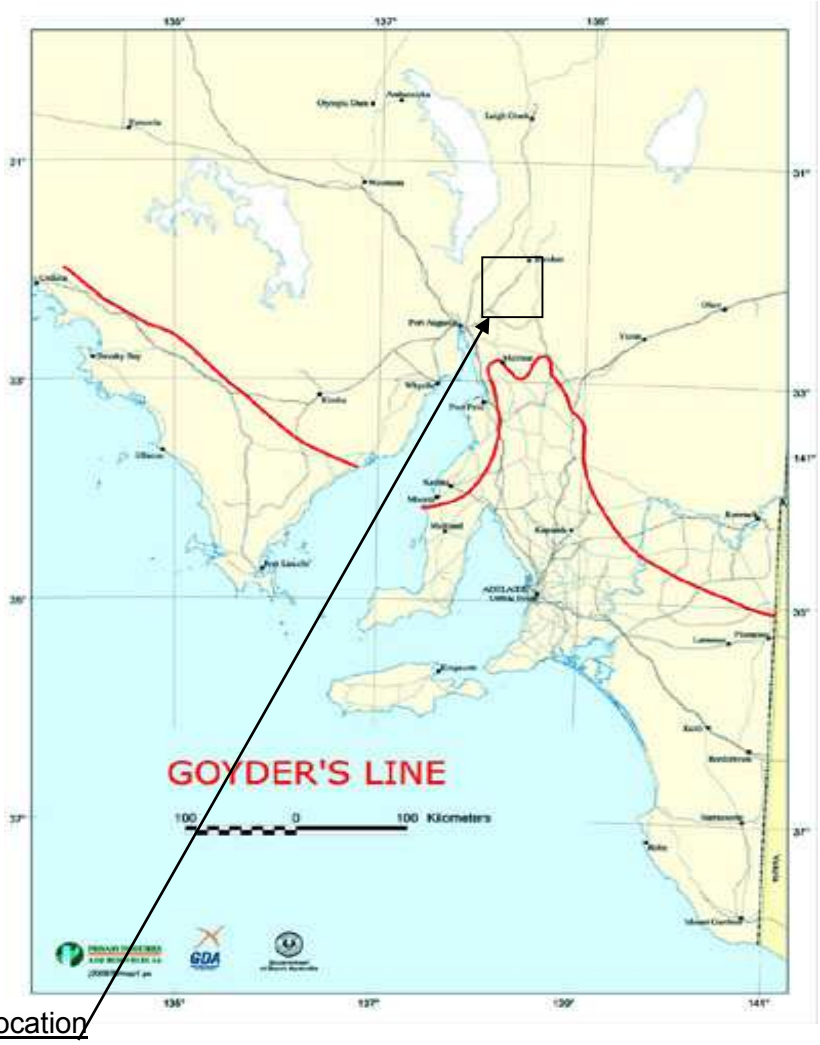



*Figure 14:* The vulnerability of SA country towns. Note Quorn and Hawker (Marked on map) Red indicates most vulnerable towns. (Beer, 2012)

## CLIMATE CHANGE AND GOYDER'S LINE

The Council Area straddles the "Goyder's Line" a line surveyed by George W Goyder plotting rainfall expectations by studying a distinct change in vegetation. By the 1870's rainfall had increased and many farmers ignored the warning Goyder had made only to conduct light grazing beyond the line. By the 1880's and 1890's many farmers were ruined, and to this day, ruins of farm buildings and ghost towns appear beyond the Goyder Line. (State Library of South Australia, 2007) (Bell, Heritage of the Upper North - Background History, 2000)

The Goyder Line, has been identified as historically relevant, but not a fixed demarcation of cereal growth regions. The researchers, in a joint report by the CSIRO Ecosystem Science/Climate Adaptation flagship and the South Australian Research and Development Institute (SARDI) climate applications agency, demonstrated the Crop Margin, is set to narrow, and travel further south by 2050, thus decreasing the land available for cereal crops, in South Australia, primarily because of a projected shift in a rainfall (P) to potential evaporation (E) ratio (PE). Two climate models were used, one "wet" and one "dry". (Nidumolu, 2012)




Approximate Council Location

***Figure 15:*** shows a Map of the historical Goyder's Line in red. (History Trust of South Australia, 2003)

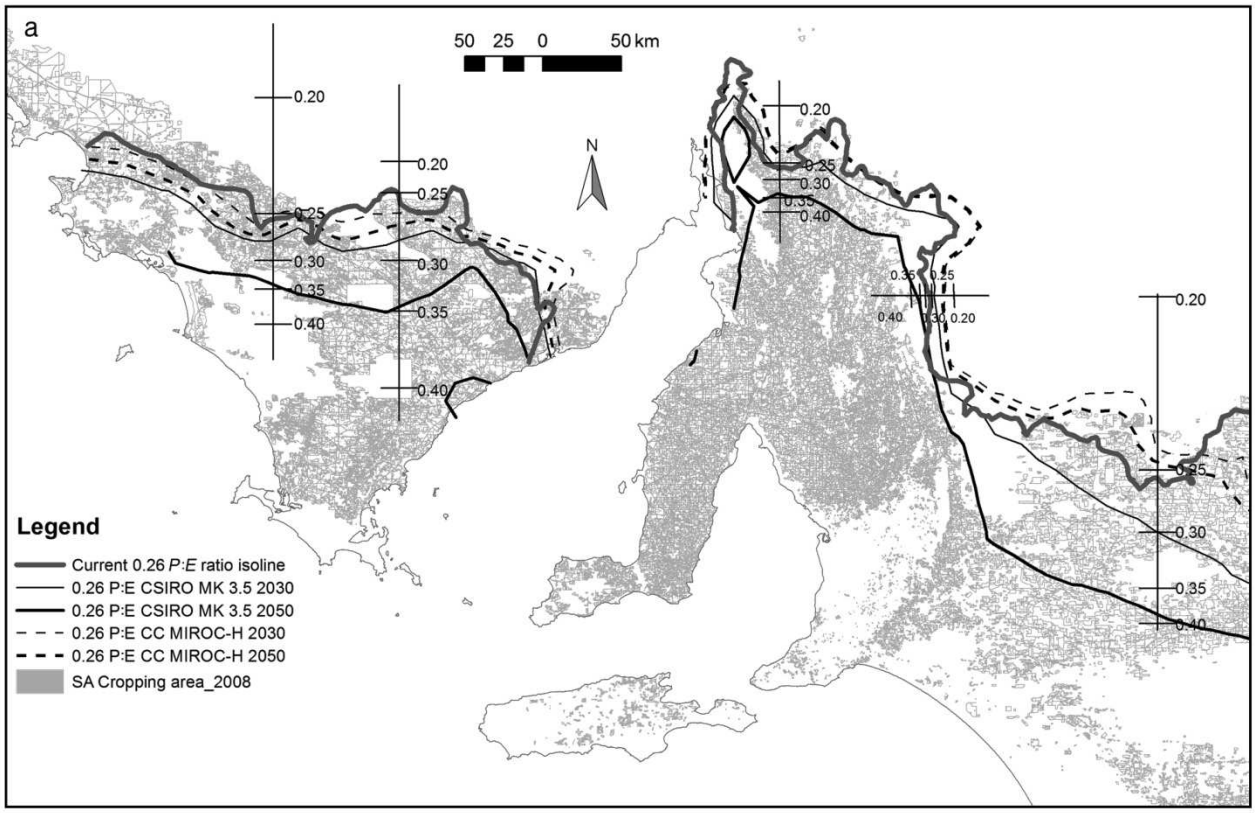



Fig. 6. Precipitation:evaporation ($P$:$E$) ratio of 0.26, generated for 2030 and 2050 using CSIRO Mk3.5 and CC MIROH-H climate models. Transect values = $P$:$E$ ratios of current climate along Goyder's Line in South Australia (SA)

***Figure 16:***

Note the lower thinner continuous line, representing a shift in the PE ratio in the land affected, from the current 0.26 PE ratio, which represents the limit of cropping at present. 0.26 PE ratio, represents the precipitation to evaporation threshold, where cropping is limited, by climate**.** The upper thicker, continuous black line represents the current limit of the 0.26 PE ratios, and the upper limit of cropping at present. The lower, thinner, continuous line represents the border of productive cropping land by 2050, using CSIRO projections. This means, lands to the north of the thinner, most southern black continuous line, currently able to be cropped will, in likelihood, will not be able to be cropped for cereal production. (Nidumolu, 2012)

**Analysis of the Climate**

The semi-arid to arid area of the Council must prepare for drought as well as the damaging and beneficial effects of flood. There is a lot of archaeology, in the form of ruins, as well as history both written and oral, with regard to the variability of the climate and weather in this Council area. (Griffiths, 1986) (Bell, Heritage of the Upper North - Background History, 2000). It would be negligent to ignore the evidence.

## DEMOGRAPHICS

### Emergency Management Context

Demographics are an important form of intelligence and information for emergency management as they provide points for making decisions for example evacuation needs or how to reach and educate people in regard to emergency management issues, such as floods and earthquakes, or volunteer participation in emergency service agencies.

For 30 June 2011 the population demographic estimates of the Council were:

- 1702 total population
- A population density of 0.4 persons per $km^2$
- In 2006, the population was 1791, representing a negative growth rate 5 years.
- 10.7% were indigenous Australians
- 13.0% were born overseas
- 50.5% are 45 years or older
- 19.1% are 65 years and older (approximately 575 persons)
- 35.2% of people of the Council area are on low income
- 8.3% spoke a language other than English at home.

**Note:** At NERAG's catastrophic level of mortality being > 1 death in 10,000, > 1 death in the local population of 2,966, is a difference in ratio by 70%. It would be safe to assume that within the local community 1 (perhaps preventable) death as a result of disaster is very tragic at least, and would affect the small community as a whole. **(NERAG AS/NZ ISO 31000:2009)**

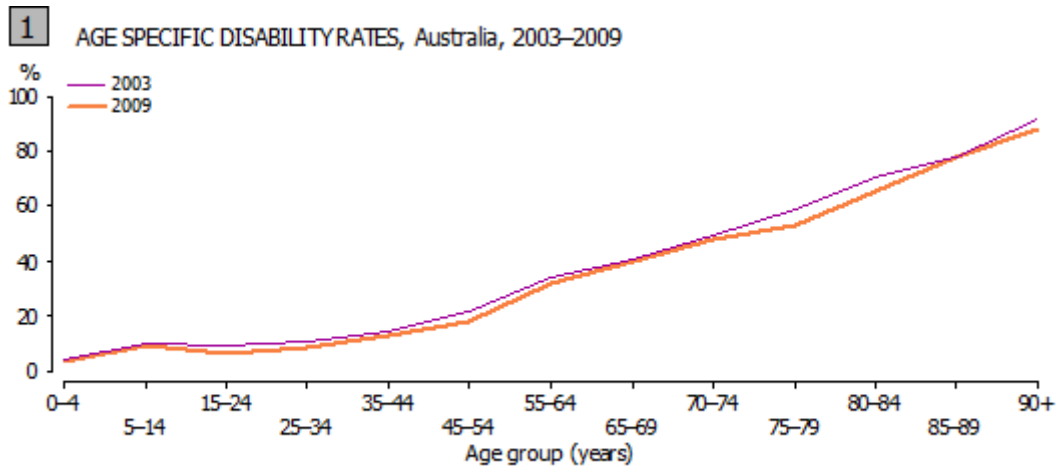



***Figure 17:*** **shows the close relationship between disability and ageing**. (ABS, 2011)

### Analysis of the Demographics

The towns, villages and settlements including farms are scattered across a wide area, relatively speaking in comparison to Australian major urban centres. People face geographical if not social isolation. The indigenous community in the Council area is much higher than the national average. The population is ageing, and taking into account the relationship between disability and ageing, the availability of volunteers for strenuous physical fire fighting and rescue operations is decreasing. The number of people on low income should be highlighted as it can indicate a general inability to be able to move quickly without some form of assistance, in an evacuation, as evidenced in disasters such as New Orleans with Hurricane Katrina. (Townsend, 2006)

## VOLUNTEERISM

A well as taking into account, the above correlation between age and disability, and its affect up a physically able emergency volunteer base, Dr. Judy Esmond (2009) identified five major challenges to the recruitment and retention of emergency service volunteers. These are in brief:

1. **Time**

1.1 Traditional, long serving volunteers are being replaced with time sensitive volunteers, including those who are fly in, fly out to mines, such as Olympic Dam.

**2. Training**

2.1 Community, political, organisational as well as litigious pressures, have contributed to an increasing importance and amount of volunteer time spent in extensive accredited training programs, by the above time sensitive volunteers. Anecdotal evidence collected by the author of the CERM suggests that training which requires volunteers to "jump through hoops" and constant government accreditation regimes "shifting the goalposts" combined with constant re-training, is extremely irritating.

**3. Cost**

3.1 Costs such as fuel to get to training, are increasing.

**4. Recognition**

4.1 Not being taken for granted.

**5. People**

5.1 Better leadership skills needed, as well as involving women in response, and people from diverse groups within the community

## A DISASTROUS HISTORY – COUNCIL AREA

The existing communities served by the Council, have in many ways, shown enormous resilience in the face of many hardships, over their short history. History, which is properly, the study of written records, and thus mostly European in nature, is miniscule in comparison to that of Aboriginal occupation, supported by archaeological evidence (Bowler, 2003). Stratigraphic analysis of Hawker Lagoon showed evidence of the Adnyamathanha people, and earlier studies indicated occupation 15000 years ago (Walshe, 2005). Evidence of prior Aboriginal occupation and prior ownership is all over the Flinders Ranges. (Flinders Ranges Research, 2012) When considering the history of human occupation within the environment of the area, all human occupation needs to be considered.

Radiocarbon archaeology of Central Australian Aboriginal late Holocene cultures found that these societies changed their patterns of habitation of the last 2000 years in response to such climatological phenomena as La Nina and El Nino, finding a correlation between in timing between climate change and *"…radiometric determinations associated with human activities is unequivocal"*. (Williams, 2010). That Aboriginal people reacted and adapted to lack or abundance of resources such as food and water, affected by changes in climate, is clear. (Attenbrow, V, G. Robertson and P Hiscock, 2009)

Early European settlers were plagued by rabbits, corellas, locusts, sparrows, wild dogs and kangaroos eating and destroying their crops and herds. Droughts killed crops, floods drowned people, ruined fences and washed away creeks in raging torrents that disappeared into the never-never, fires threatened everyone, earthquakes rattled the china, dust storms swept the land, Typhoid and other diseases were ever present. (Griffiths, 1986) (Carrieton Centenary Committee, 1978) (Mitcham, The hub of the Flinders: The story of the hawker district embracing the towns of Cradock, Wilson Hookina and Wonoka, 1980) (Size, 1985) (Ward, 1974) (South Australian register, 1889) People also resorted to violence over water supplies. (Shephard, 1976).

## Pest Species and Ecology

Mice, rabbits, as well as sparrows are all introduced species. Mice plagues develop over a 9 to 18 month time period after wet seasons where grains are abundant. House mice usually frequent the highly modified agricultural habitats not used by native mice. "*One reason that mouse plagues form in Australia is a lack of competition from other small native herbivores."* (CSIRO, 2003) It can be seen that plagues, like mice, but also including Corellas, form when the ecology is out of balance. Lack of suitable predators is also a factor.

## Desertification

Desertification has been a factor of the Australian continent for aeons. At the Ice Age Maxima, approximately 18,000 years ago, even Tasmania had a temperate semi desert of sparse shrub land and grassland while **all** of South Australia, had "*Tropical Extreme Desert (very sparse vegetation, or completely barren)*" (J.M. Adams and H. Faure (Editors), 1998)

## Abandonment and ruin

The history of abandonment of towns like Yongala, Dawson, Kanyaka, Hammond, Bruce, Wilson and Eurelia, was primarily because of an unsustainable water supply; irregular unreliable rainfall that could not support the population, and a settlement policy informed by politics, not science. (Mitcham, The hub of the Flinders: The story of the hawker district embracing the towns of Cradock, Wilson Hookina and Wonoka, 1980) (Ward, 1974) (Bell, Heritage of the Upper North: Background History, 2000) (Griffiths, 1986) (Burden, 1983). Improvements in transport technology with the development and application of the automobile, replacing trains and horse drawn vehicles, also played a role in the destruction of these towns (Ward, 1974). Water, however continues to play an ever important role in the near past and the foreseeable future of the Council district.

## Emergency Management Context

*"Those who cannot remember the past, are doomed to repeat it."*
(Santayana, 2005)

Historical and scientific studies provide for the levels of confidence by which risk can be calculated. (National Emergency Management Committee, 2010) Emergency management by its nature is an interdisciplinary subject, which aims to take note of all advances in physical, social sciences and humanities and apply them all to a comprehensive understanding of emergencies. By referencing historical and pre-historical studies, we garner an understanding of the possibilities of the present and future.

## Analysis of Climate Change in the Context History and Prehistory

Climate change is a fact of life on Earth. Further:

"*In 2007 the Intergovernmental Panel on Climate Change (IPCC) released their fourth assessment report, concluding that:*

- *Warming of the climate system is unequivocal*
- *Humans are very likely to be causing most of the warming that has been experienced since 1950*
- *It is very likely that changes in the global climate system will continue well into the future, and that they will be larger than those seen in the recent past.*

*These changes have the potential to have a major impact on human and natural systems throughout the world including Australia*." (CSIRO & BOM, 2012)

Another point to consider is that it has been demonstrated in the long history of the arid Middle East, people are prepared to wage war, kill, maim, cripple and dismember each other over access to water resources. (Copley, 1984). Even in the short history of European settlement in the Flinders, people fought and argued over water. (Shephard, 1976)
To say that lack of water resources is a presents a hazard to the social cohesion and resilience of the Council area is an understatement.

## CULTURE, RELIGION AND LANGUAGE HOMOGENEITY AND/OR DIVERSITY

### Emergency Management Context

Culture, Religion and Language homogeneity and / or diversity are also critically important intelligence for an emergency manager. It identifies specific needs that may need to be addressed such as the provision of interpreters, and the levels of homogeneity/diversity are broad indicators of the capacity for community resilience and preparedness, as well as reception to community education. (Paton, 2001) It also provides an emergency manager with information about the diversity in thinking within a community, as religious and philosophical ideas, ethics and morality, informing cultural practices and sensitivities, form much of the basis of an individual's world view, thus shaping the society in which they live.

- Less than 4% of the population of the Council area, do not speak English fluently
- Australian born, 87.0
- Approximate percentage of total population of overseas born persons of United Kingdom born 3.3%, Dutch and German 1.2%., New Zealand 0.5%. other 8%.

Religious beliefs are an optional question for the Census, and while there is some diversity in Western European derived religious identification and thinking, they have more similarities than differences. Local religious believers form peak local bodies, appointing common leadership for practical, pragmatic purposes including Emergency response and recovery. The religious and philosophical stream statistics are:

- Mainstream Western European Christian (Uniting, Anglican, Catholic, Lutheran) equals approximately 53.7%
- No religion, including agnosticism and atheism and religion not fully described equals approximately 26.7%

There are many Aboriginal Sacred Sites in the Flinders Ranges. (Quorn Visitor Information Centre, 2010)

### Analysis of Culture, Religion and Language Homogeneity and/or Diversity

The language culture of the area is comparatively homogenous contrasted with many Australian urban areas. Plain English instructions spoken orally or in written form should be understood by the vast majority of residents. Overseas immigrants in the area are mostly of northern European origin. Less than 1% of the population did not speak English fluently, indicating there is minimal need for interpreter skills in Emergency situations, and however the statistics did not include international tourists in this international tourism zone. Religiously, philosophically most residents belong to mainstream Christian religions also indicating high homogeneity, with most mainstream Christian denominations having a better capacity for less divisive rhetoric in a more secularised societal era as indicated by the large proportion of those professing no religion, or religion not fully defined.

The bottom line, is that this Council area is generally, socially cohesive. There is no apparent threat of sectarian violence within the resident community.

## MOBILITY – DISABILITY AND GENERAL

### Emergency Management Context

Mobility is a critical factor in making decisions about evacuation, in the context of emergency management. (NERAG AS/NZ ISO 31000:2009).

By calculation of the percentage of South Australians with a disability that require assistance with mobility, and applying this percentage to Council Census statistics, a broad impression was formed which enables an estimation of persons with a disability that require mobility assistance.
These numbers are:

- Approximately 3% of all Council area people require mobility assistance (ABS, 2010)
- The approximate number of people with a disability in the Council area requiring mobility assistance equals 56.

General Mobility:

- 11.5% did not have a registered vehicle (ABS 2011)

### Analysis of Mobility – Disability and General

Assistance with transport of those affected by disability including the frail aged will probably be required if evacuations are needed. The general mobility of the community appears to be good, with almost all people, statistically speaking having access to some form of vehicle. Caution must be used however, as farmers in isolated areas would have to include registered tractors and farm implements in the census questions.

# INDUSTRY, ECONOMY, AND COMMUNITY CAPACITY

## Emergency Management Context

The main industries, economy and community capacity are integral to a comprehension of the emergency management needs of the Council as they can show potential vulnerabilities to major emergency events.

## Economy and industry

The economic statistics and facts are:

- Unemployment rate was estimated in 2011 at 4.5%, less than the current national average
- Total gross value of agricultural production, 7.6 million dollars. (ABS, 2010)
- Tourism is a major and growing sector of the local economy, competing in an international market place. (TRC, 2011, p. 19)
- Businesses serving these main industries, are scattered among Hawker and Quorn

## Industrial Hazards

As farming, grain and fuel storage as well as light industry occur in the district; the risk register included industrial hazards. Olympic dam mine was also considered as part of the risk equation. (See earlier discussion).

## Community Capacity

*"Intrinsic to most descriptions of community capacity are ideas and practices of community participation."* (Department of Health SA, 2007, p. 8)

Within the context of Emergency Management, community capacity is best illustrated by a quote from Winkworth, *et al*, published in the Australian Journal of Emergency Management.

*"The terms 'capacity building', 'social capital' and 'social cohesion' are often used interchangeably in the literature. While acknowledging the subtle theoretical differences between these concepts, all have in common a reference to factors which contribute to the well-being and social and economic stability of a community* (Dwyer, 2005) *– such as levels of trust, support and the social networks or lack thereof which are critical to wellbeing, recovery and indeed 'resilience' after major adversity."*
(Winkworth, Healy, Woodward and Camilleri, 2009)

It is argued, that a good a good indication of trust, support and social networks, as well as community participation are volunteering rates, these are as follows:

- Council area residents performing unpaid volunteering with organizations – 31.6% (ABS 2011)
- National rate of Volunteers over 18…. 31.6% (ABS 2011)

If it is accepted that community capacity is indicated by the level of voluntary work, this Council area could be stated to be almost 4% more resilient and socially cohesive with strong social bonds and higher levels of trust than the national rate.

As illustrated in the section, **Culture, Religion and Language** *etc.* (above) this is a socially cohesive community, and it is hypothesised that only enormous pressure from an extremely destructive disaster would have any impact on community cleavage points.

## CRITICAL INFRASTRUCTURE

Critical infrastructure is an Emergency Management and Military term, which defined by the EMA is:

*"A service, facility, or a group of services or facilities, the loss of which will have severe adverse effects on the physical, social, economic or environmental well-being or safety of the community"*
(EMA, Critical Infrastructure Emergency Risk Management, 2004)

Accordingly in a local government context, there are two broad types of critical infrastructure, that which is Council owned and/or operated, and that which is in the Council area and owned or operated by people or entities other than council, such as State and Federal Government, private citizens, and private enterprise or non-Government Organisations.

**Council controlled critical infrastructure**

The following is a list of council owned, operated or regulated critical infrastructure:

- Sewage or septic wastewater engineering, systems and processes
- Rubbish disposal systems, engineering and processes
- Potable water where available and controlled by Council
- Roads including bridges, causeways, culverts and drains
- Communication, including political and administrative leadership, and the infrastructure to deliver the communication, such as an equipped office

Council controlled infrastructure is being mapped using Google Earth and will be in a separate set of computer files, to be accessed via the Council Emergency site.

**Non Council controlled critical infrastructure in the Council District**

- Telecommunication networks
- Radio and Television broadcast towers
- Water supplies
- Food supplies
- Electricity
- Industries, particularly agriculture, including Silos
- Police, Fire, Ambulance and SES stations
- Hospital
- Local heritage rail network
- DTEI controlled roads.
- Environmental and cultural assets including clean, pollution free, conservation parks contributing to tourism based economy

Readers of this plan are referred to Zone Emergency Management Committee plans and maps detailing the location of this infrastructure.

## SAFETY SERVICES

The Council area has the following emergency health, safety and security services:

- Quorn Police Station
- Hawker Police Station
- Quorn and Hawker area CFS volunteer fire brigades
- Quorn SES volunteer emergency unit, Hawker unit currently non operational
- Quorn and Hawker SA Ambulance volunteer stations
- Royal Flying Doctor Service coverage

Safety services are being mapped using Google Earth and will be in a separate set of computer files, to be accessed via the Council Emergency site.

## HAZARDOUS SITES

Hazardous sites in the Council area will be mapped using Google Earth and will be in a separate set of computer files, to be accessed via the Council Emergency site. Hazardous sites include grain silos and fuel-stores; Quorn also has a Barite treatment plant.

**All farms** within the area should be treated with some caution in emergency situations, as they often contain many hazardous materials in relative bulk, in order to conduct the day to day business of farming.

### OLYMPIC DAM – RADIOACTIVE DUST

Radioactive dust from the Olympic Dam mine, near Roxby Downs, has been perceived as a threat to Australian and New Zealand population centres, east of the mine, in the path of westerly prevailing winds. (Aiken, 2009) These population centres, include the towns and villages of Council. BHP Billiton owners and operating miners of the Olympic Dam mine site, claim, with supplementing evidence in the Supplementary Environmental Impact Statement (EIS) of 2011 that risks are within acceptable limits. (BHP Billiton [a], 2011) A Federal Government website, affirms this, and says that BHP Billiton will comply with South Australian State air quality law and policy. (Department of Sustainability, Environment, Water, Population and Communities, 2012)

Anti-Nuclear and environmental activists, claim that the dust storms will threaten Australian cities, especially from the proposed tailings site. (Macpherson, 2011) The activists, however, offer no evidence capable of being investigated, other than the size of the tailings pile. A submission to Parliament by distinguished scientists, including Nobel Prize winner Dr Peter Doherty, and Sir Gustav Nossal, warned of the hazardous health effects of the proposed, open cut, Olympic Dam expansion. (Shearman, 2011) There was no accompanying evidence cited, for the proposed health risk.

### OLYMPIC DAM – GROUNDWATER RESOURCE DEPLETION AND POLLUTION POTENTIAL

BHP Billiton claims that the water table depletion and the potential for pollution are minimal, as a result of testing, claiming that the chemical analysis of the water from various sites around Olympic dam, are chemically different from each basin, including the Great Artesian Basin (GAB). (BHP Billiton 2011) As they are chemically different, and a distinct zone exists where the GAB ceases, including the Mound Springs of Indigenous cultural significance, the BHP Billiton EIS concludes, that the Olympic Dam mine expansion, will not affect other aquifers, toxically or by depletion. (BHP Billiton 2011) BHP Billiton has to date not replied to emails and enquiries regarding draw upon GAB water. However, other claims are made. Green party State MP, Mark Parnell, claims that the mine will draw water from the GAB. (Parnell, 2012) Mr Parnell, however offers no evidence.

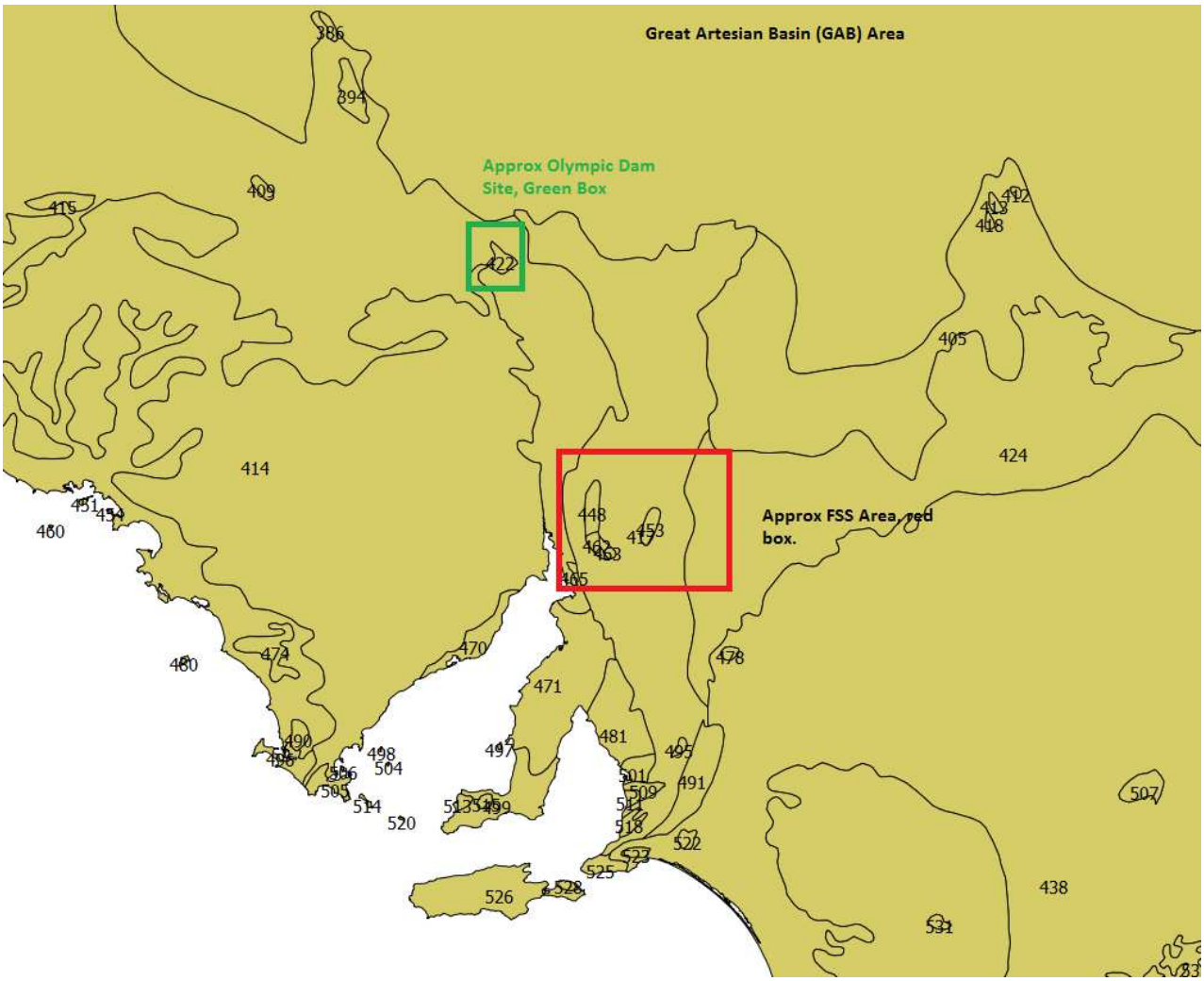



***Figure 18:*** GIS Data from (Geoscience Australia, 2012) Modified, Numbered areas represent discrete groundwater zones.

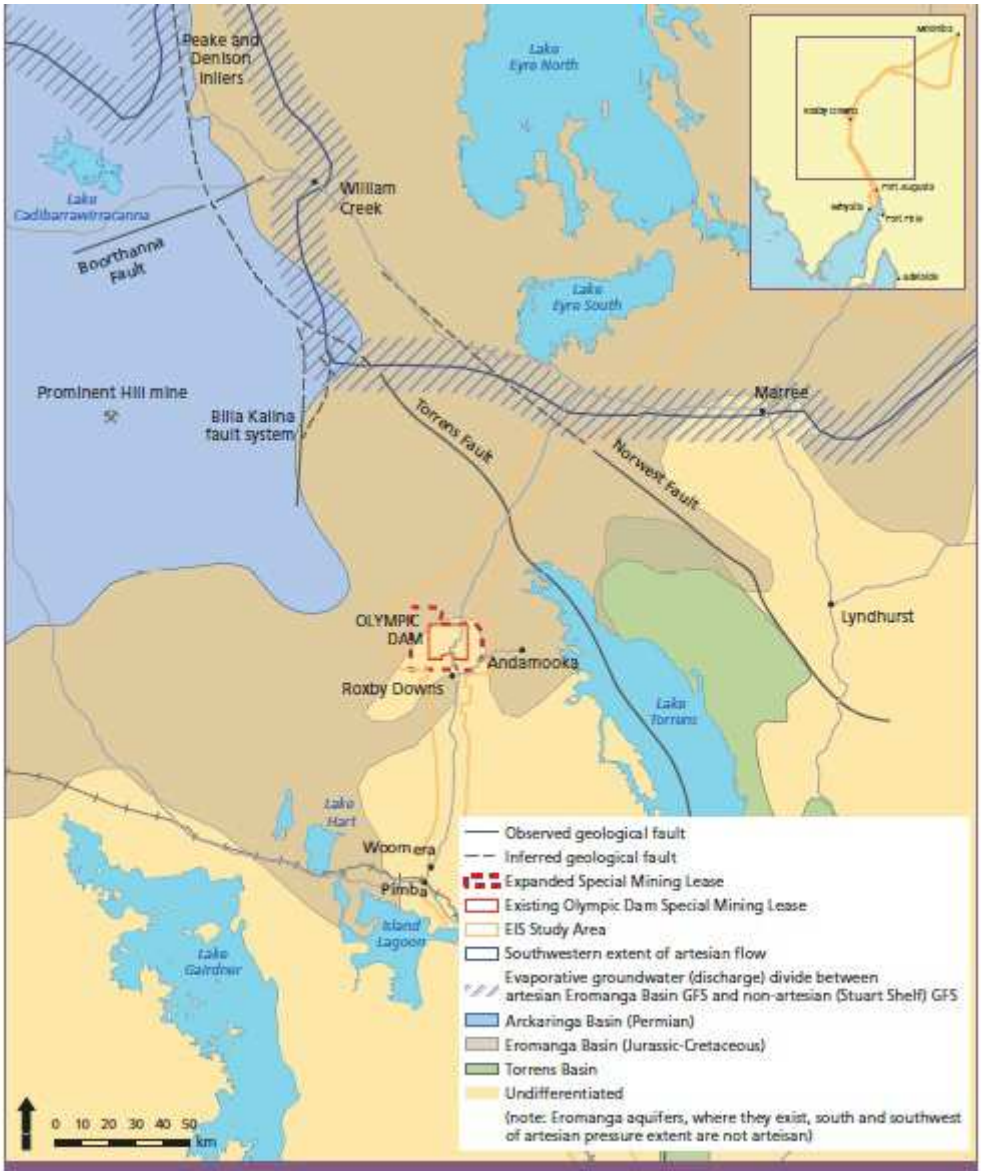



***Figure 19:*** Aquifers, including the Stuart shelf from (BHP Billiton, 2011)

## SETTLEMENT PATTERN

The settlement pattern of the Council area is primarily 2 small towns, Quorn, Hawker and the village of Cradock. Small pockets of cereal crops, and larger grazing lands for sheep, surround the towns. The towns serve the rural communities in which they are placed. Tourism is the main Industries of both Hawker and Quorn; Hawker the gateway to Wilpena Pound, and Quorn having such attractions as the Pichi Richi Railway. Quorn has an important Barite treatment plant. Some Quorn and Hawker residents are Fly-In, Fly-Out workers in isolated mine sites in South Australia.

However, the settlement pattern, especially the archaeology and historical record show that in the past, more settlements were in existence. Doctor Peter Bell, a specialist archaeological historian writes:

*"It is not rainfall in its statistically simplest form, the annual average that has had most impact on European settlement of the Upper North* (of S.A.). *Rather it is the deviations from that average, the cycles of prolific rain - which the early settlers of the Upper North convinced themselves, were normal -followed inevitably by years of drought that have shaped the economy and the way of life of the region for 160 years."* (Bell, Heritage of the Upper North: Background History, 2000)

Ruins of towns and settlements exist within the Council area, including Wilson, Kanyaka, and the remains of Cradock bear testament to the vagaries of unpredictable, unreliable water supply. Settlers believed they could grow crops beyond the Goyder Line and were proved right in unusually wet years. However normal aridity returned; ruined people financially and people eventually abandoned the towns, leaving ruins. (Mitcham, The hub of the Flinders: The story of the hawker district embracing the towns of Cradock, Wilson Hookina and Wonoka, 1980)

***An understanding of the importance of water supply in this Council area is critical to an understanding of the long term sustainability and resilience of these communities.***

## OTHER HAZARDS

### WAR AND TERRORISM

**Terrorism**

With regard to water supplies, and transport routes, it should be noted that Water and Transport Agencies, are identified as part of the Trusted Information Sharing Network (TISN) as outlined in the Critical Infrastructure Resilience Strategy. (Commonwealth of Australia, 2010) This was developed by the commonwealth in response to the threats

There are four alert levels, published as part of the National Terrorism Public Alert System. The four levels are:

1. Low – Terrorist attack is not expected
2. Medium – Terrorist attack could occur
3. High – Terrorist attack is likely
4. Extreme – Terrorist attack could occur

The current terrorism alert level for Australia is **MEDIUM** (National Terrorism Public Alert System 2014) Terrorism is a higher risk to major city dwellers, and a much lower risk to rural Council districts. Terrorism is the responsibility of SAPOL. (State Emergency Management Committee, 2011) Refer to Council Business Continuity Planning.

**War**

Australian defence force (ADF) is currently involved in 9 ongoing Global Operations, including Afghanistan, Border Protection, Southern Indian Ocean, Israel / Lebanon, Egypt, Southern Sudan, South West Pacific, South West Pacific nations, South China Sea / Indian Ocean.. (Department of Defence, p. 2014) In a Defence Department public discussion white paper, of 2008, Australians contributors noted several emerging threats, these were:

1. "*Climate change will diminish food and water supplies, displace populations and trigger more frequent and more severe weather events*."
2. "*Rapid regional growth could lead to strategic competition for minerals and energy reserves across the Asia Pacific*. "
3. *"Threat of cyber warfare to Australia's infrastructure, economy, and transport and indeed to public safety*."
4. "*Strategic implications of peaking energy supplies, and the ensuing economic and political consequences*."

List compiled and quotes from: (Department of Defence (A), 2008)

There is significant historical data, almost everywhere one looks, of war and the effect of war on this Council district. War is the domain of the Commonwealth Department of Defence. However, Local Government has been used in the past for war efforts, such as recruitment centres. (Griffiths, 1986) (Burden, 1983) Council is referred to Business Continuity Plan contingencies.

## DISEASE

Disease is defined as "*an impairment of the normal state of the living animal or plant body or one of its parts that interrupts or modifies the performance of the vital functions, is typically manifested by distinguishing signs and symptoms, and is a response to environmental factors (as malnutrition, industrial hazards, or climate), to specific infective agents (as worms, bacteria, or viruses), to inherent defects of the organism (as genetic anomalies), or to combinations of these factors*" (Mirriam Webster, 2012)

### HUMAN DISEASE

There is significant risk of infectious human disease including Epidemics and Pandemics in the Council Area (Griffiths, 1986) (Adelaide Advertiser, 1890). Response and Recovery management of major outbreaks of infectious human disease in South Australia is managed by the SA Department of Health, Public Health Office, where Risk assessments are done on a state wide level. Professional Council Environmental Health officers are appointed under the Public and Environmental Health Act 1987 and enforce the law contained within the above Act of parliament. Professional Officers at the State, regional and local level conduct risk assessments and carry out mitigation strategies. (SA Health, 2012)

With the new SA Public Health Act 2011, there is provision for Local Government to carry out health planning. Council may find that in the future there are legislative and or regulatory changes responding to changes in circumstance and thus should refer to Business Continuity Planning strategies dealing with legislative and regulatory changes.

### ANIMAL AND PLANT DISEASE

Preparation Prevention Response and Recovery management of major animal and plant diseases threatening animals and plants of social and economic significance are managed at a State and regional level by PIRSA, the Department of Primary Industries and Regions SA. The documents used by PIRSA are:

1. PIRSA's Agriculture and Animal Services (AAS) Functional Service Plan under the State Emergency Management Plan, as a functional service

2. PIRSA Emergency Management arrangements

Neither of these documents referenced above are available for public access.

**Council may be requested to assist in whatever way possible with Human,**

**Animal or Plant Disease through PPRR.**

**The response component may rely upon engineering services.**

# ANIMAL, BIRD, WEED PLANT AND INSECT PLAGUES

## VERTEBRATE PEST ANIMALS

There is a significant risk Rat and Mice plagues including historical data of such pestilence in the Council Area (Griffiths, 1986) (Burden, 1983). Prevention, Preparation Response and Recovery is managed by the SA Department of Health, Public Health Office (SA Health, 2012), and PIRSA. (PIRSA 2012) Other vertebrate pests include Wild Dogs (Dingos), Feral Cats, European rabbits, foxes, feral goats, feral camels and feral deer. (PIRSA 2012) Council has a legislative mandate for the control of Cats and Dogs. (LGA SA 2012)

## WEEDS

There are at least 125 declared weeds in South Australia, that must either be controlled, destroyed, or are notifiable, the weeds range from African boxthorn, to Yellow Burweed. (Biosecurity SA 2008). Weeds present a risk to agricultural and horticultural production and public safety. Landowners have the responsibility for destruction, control and/or notification of declared weed species. (PIRSA 2008)

## PEST BIRDS

The Council area, has a significant pest bird problem, in the form of Parrots species specifically Corellas.
It is worth noting that the Corella (Cacatua sanguinea), is an "***unprotected native species"***, (DEWNR, 2011) permits are needed to trap and gas the species but no permits are needed to shoot the species. Guidelines have been developed for Local Government, regarding management of the species. (Department of Environment and Heritage, City of Onkaparinga, 2003)

## PEST INSECTS

Locusts and grasshoppers have historical data associated with plagues in this region. (Griffiths, 1986) (Todd, 2010) Further evidence of cereal crop destruction by insects, in the Council area, specifically Hawker, are in the 1909 edition of the Adelaide Register, Page 5. (Adelaide Register, Journalist Unknown, 1909) Control of such insect pest is the domain of PIRSA. (PIRSA 2010) More recent plagues occurred in the Flinders Ranges in 2010 (ABC, 2010)

**Council may be asked to assist in whatever way possible with PIRSA managed pests,**

**such as handing out poison, baits and traps**

## ASTRONOMICAL PHENOMENA

"*Space radiation is made up of three kinds of radiation: particles trapped in the Earth's magnetic field; particles shot into space during solar flares (solar particle events); and galactic cosmic rays, which are high-energy protons and heavy ions from outside our solar system. All of these kinds of space radiation represent ionizing radiation."* (NASA , 2002)

### METEORITES/ASTEROIDS

There is no scientific evidence that any significantly sized meteorites or asteroids are going to damage the earth any time soon. (NASA, 2012)

### SOLAR STORMS

NASA reports that the predicted solar storms, and solar maximum, for the near future will not cause massive environmental, social and economic damage, and there are contingencies in place, for electrical grid and satellites. (NASA, 2011)(NASA 2010) Council is referred to Business Continuity Planning dealing with technological failure, such as power outage and communication black outs. The Australian Bureau of Meteorology space weather office reports similar findings. (BOM Space Weather Branch, 2012)

### GALACTIC HAZARDS

The nearest "Black Hole" to Earth 1600 light years away is in the Constellation Sagittarius and along with a star named **V4641 Sgr** form part of a "*violent system that briefly flooded part of our Milky Way Galaxy with X-rays*" (NRAO, 2000) There is also a Black Hole in the centre of the Galaxy (NASA 2010) The strong magnetic field and atmosphere of the Earth protects us from most space radiation. (NASA 2002)

**At best, most Galactic hazards are unknown quantities, requiring high level research.**

# OBJECTIVES

The objectives of this Community Emergency Risk Management Plan are:

***Table E***

| | |
|---|---|
| **1** | Conduct an assessment of the risks to the Council community from inundation by torrential rain causing flood. The rain may likely either come from the north as part of post-cyclonic depression, or from the south west to west. |
| **2** | Conduct an assessment of the risks to the Council community from heatwave caused from a high pressure system usually emanating from the west, causing temperatures for 3 or more days of average 24 hourly temperatures above 32$^{o}$ Celsius. SES will warn of impending event |
| **3** | Conduct an assessment of the risks to the Council community from bushfire/wildfire, especially emanating from the National Park. The bushfire may have a diverse aetiology but may occur on extreme or catastrophic fire days, aided by adverse weather conditions |
| **5** | The assessment will address the risks from an earthquake, associated with fault line and plate movement to the community and consider possible impacts to people, public administration, social setting, economy and infrastructure in the Council District. Earthquakes to be considered are 1:100 year and 1:500 year events. |
| **6** | Conduct an assessment of the risks to the Council community from Storm Damage including dust storms with or without radiation hazard |
| **7** | Conduct an assessment of the risks to the Council community from a major transport disaster with or without radiation hazard. |
| **8** | Conduct an assessment of the risks to the Council community from pest animals, birds and insects in plague proportions. |
| **9** | Conduct an assessment of the risks to the Council community from drought and consequential water deprivation. |
| **10** | Conduct an assessment of the risks to the Council community from war and terrorism with or without radiation hazard. |
| **11** | Conduct an assessment of the risks to the Council community from disease, affecting humans, animals or plants. |
| **12** | Conduct an assessment of the risks to the Council community from astronomical phenomena and space weather. |

These assessments will be conducted in order to prioritise the Council's emergency management efforts through prevention - mitigation, preparedness, response and recovery.

# SCOPE

## NARROWING THE SCOPE

It will be shown by the argument below that it is not practical, especially in the sense of legislated powers and responsibilities, as well as from a time management perspective, to take into account every emergency risk to the Council community. However, a certain combination of common sense, scientific evidence and professional judgement must be applied, as well as the rigour of measurable consequences and the probability of likelihoods. The scope of this Local Government plan is to conduct risk assessment of Emergency events broadly defined by Emergency Management Australia (EMA), as:

"*Events, actual or imminent, which endanger or threaten to endanger life, property or the environment, and which require a significant and coordinated response*"
(EMA, 2009)

This Local Government plan takes into account the Legislation quoted above in this document, but takes note most particularly the Local Government Act 1999, Section 7 Subsections (d) and (f) which are as follows:

***"7 – Functions of a council***
*The functions of a council include –*

*…*
*(d) to take measures to protect its areas from natural and other hazards and to mitigate the effect of such hazards.*
*…*
*(f) to provide infrastructure for its community and for development within its area (including infrastructure that helps to protect any part of the local or broader community from any hazard or other event, or that assists in the management of any area);"*

Further:
***"298—Power of council to act in emergency***

*(1) If flooding in the area of a council has occurred or is imminent and the council is of the opinion that a situation of emergency has arisen in which there is danger to life or property, it may order that action be taken as it thinks fit to avert or reduce the danger.*
*(2) A person who acts in good faith in pursuance of an order of a council under subsection (1) incurs no civil liability by doing so.*
*(5) While a declaration under the Emergency Management Act 2004 is in force in relation to flooding in the area of a council, the powers conferred by that Act operate to the exclusion of the powers of the council under this section.*

Also considered carefully in the preparation of this CERM is the fact that Council has in **no** mandated or legislated manner, have any Control or Coordination Role in **response** to Emergencies/Disasters. The role of council is outlined in the Local Government Association (LGA) of South Australia document entitled, "***The role of South Australian Local Government in relation to Emergency Management***" (LGA 2007). The report states in the executive summary:

*"There is a lack of clarity about the role of Local Government in relation to emergency management in South Australia…. It was identified that Councils are typically more involved in mitigation and recovery strategies…. Councils have a supportive role in local emergency management arrangements…In view of this finding* ***Councils need to conduct local risk analysis*** *in order to focus their long standing broad emergency mitigation programs."* (LGA SA, 2007, p. 4)(Emphasis added).

In Annexe B of the State Emergency Management Plan (SEMP) local governments are listed as a Support Agency, as opposed to a Lead Agency, in the provision of engineering functional services. Functional Services are defined in the SEMP as:

> *"Functional Services are a group of agencies that perform functional roles that support response and recovery activities during an emergency."* (State Emergency Management Committee, 2011, p. 17)

Also in the SEMP during the process of the Recovery phase:

*"198. Depending on the scale of the event, the Assistant State Coordinator – Recovery may in consultation with the Chair of the Zone Emergency Management Committee and/or the local Mayor appoint a local recovery Coordinator."* (State Emergency Management Committee, 2011)

Also considered when developing this scope for the Council, is the following quote from the Emergency Management Act 2004:

"*Division 4 –Powers that may be exercised in relation to a declared emergency*

*25 – Powers of the State Co-Ordinator and authorised officers*

*…*

*(2) Without limiting or derogating from the operation of subsection (1), but subject to the regulations, the State Coordinator or an authorised officer may, if of the opinion that it is necessary to do so, do or cause to be done all or any of the following things:*

*…*

*(b) take possession of, protect or assume control over any land, body of water, building, structure, vehicle or other thing;*

*…*

*(d) direct the owner of, or the person in time being in charge of, any real or personal property to place it under the control or at the disposition of a specified person;*"

It is clear from the above quote, in a declared Emergency, SA Police (who have the coordinating role in all emergencies), can seize council property, buildings and equipment, such as graders. However, in practice the reality is different, where most Local Governments willingly participate in emergency response in whatever way they can.

In the absence of a Declared Emergency, and to facilitate good will, a Memorandum of Understanding was developed between the LGA and the South Australian Fire and Emergency Services Commission (SAFECOM) However most South Australian Local Governments have refused to sign this Memorandum, citing lack of management control, Work Health and Safety and potentially financially catastrophic asset risk exposure.

It is also however potentially legally and politically risk laden, not to assist State Agencies, and through them, local communities, in disastrous emergencies.

Nevertheless, SAFECOM does state on its website:

*"Local Government has a critically important role in disaster risk reduction and mitigation strategies and measures as they are best placed to determine local risks and needs. Whilst local government is not the lead agency to respond to any emergencies, it has a key support role for a range of emergencies such as bushfires, floods, severe storms and potentially Pandemic Influenza"* (SAFECOM, 2011)

In the light of this information, this CERM is not an Emergency Response Plan, nor is this plan an Emergency Recovery Plan. This CERM plan is a **Risk Management** plan. It is however hoped, that under this plan, will be developed and implemented emergency response and recovery plans for Council.

In order to define the scope of this CERM plan:
The following table is a list of events
Which were **NOT** considered

***Table F***

| | |
|---|---|
| **Minor Amenity Issues.** | In contradiction to some "Emergency Plans" (City of Mitcham, 2004), this CERM Plan does not deal with tree roots or uneven footpaths as potential trip hazards. However, these might be considered in a more specific risk analysis, in light of a more litigious society. |
| **Minor Transport Accidents** | Minor traffic accidents resulting in injury of 1 to 2 persons are not dealt with in this CERM, they are incidents dealt with by SA Police, SES, SAAS & CFS.<br>As one death in a Council area of the aforementioned population is significant, these transport accident risk potentials have been addressed in this CERM report. |

## SCOPE STATEMENTS

***Table G***

| | | |
|---|---|---|
| **1** | **Flood** | The assessment will address the risks associated from a flood, linked with a tempest arriving from any direction, while considering impacts to people and infrastructure in the Council area. The entire area of the Council area will be studied. Flood events to be considered are 1:5 year to 1:500 year events, taking into consideration climate Change. |
| **2** | **Bushfire<br>Wildfire<br>Village fire** | The assessment will address the risks associated from a bushfire/wildfire or village fire with diverse causes, while considering impacts to people and infrastructure in the Council area. The entire area of the Council will be studied. The bushfire/wildfire events to be considered is a 1:10 to 1:100 year events, taking into consideration climate change. |
| **3** | **Heatwave** | The assessment will address the risks associated with Heatwave, while considering impacts to people in the Council area. The entire area of the Council will be studied. The heatwave events to be considered are 1:10 and 1:100 year events. |
| **4** | **Earthquakes & Tremors** | The assessment will address the risks from an earthquake, associated with fault line and plate movement to the community and consider possible impacts to people and infrastructure in the Council area. Earthquakes to be considered are 1:100 year and 1:500 year events. Volcanism in South Australia is dismissed as a risk. |
| **5** | **Storm damage including storms with radiation hazard** | The assessment will address the risks from storm damage, associated with a likely south western to western origin tempest, to the local community and consider possible impacts to people and infrastructure in the Council area. Storm and tempest to be considered are 1:10 year to 1:100 year events. Taking into consideration climate change. This particular scope statement includes dust storms, potentially carrying radioactive material from Olympic Dam. |
| **6** | **Transport disaster with or without radiation hazard** | The assessment will address the risks from a major transport calamity, associated with, rail network failure, driver failure, to the local community and consider possible impacts to people and infrastructure in the Council area. Transport Accidents to be considered include 1:5 year and 1:100 year events with or without an added radiation hazard. |
| **7** | **Animal, bird or insect plague.** | The assessment will address the risks from animal, bird or insect plague, associated with ecological and agricultural factors, to the local community and consider possible impacts to people and infrastructure in the Council area. Plague events to be considered are 1:10 year to 1:100 year events |
| **8** | **Drought and desertification** | The assessment will address the risks from drought and water deprivation, associated with climate change, decreased rainfall, increased salinity and lowering of the underground water table, to the local community and consider possible impacts to people and infrastructure in the Council area. Drought events to be considered are 1:20 year to 1:500 year events. |
| **9** | **Diseases of humans, animals or plants** | The assessment will address the risks from disease affecting humans, animals or plants arising from environmental sources including bacterial or viral pathogens, an consider possible impacts to people, economy, environment and public administration in the Council district. Disease events to be considered are 1:20 year to 1:500 year events. |
| **10** | **Astronomical phenomena and space weather** | The assessment will address the risks from astronomical phenomena and space weather arising from material orbiting the Earth, the environs of the Solar System and known hazards within the Milky Way Galaxy. The assessment will consider possible impacts to people, and the environment in the Council district. Disease events to be considered are 1:20 year to 1:1000 year events. |

# KEY RECOMMENDATIONS FOR MITIGATION

Key recommendations for mitigation, arising from this CERM Plan:

***Drought***: over time, according to resources, secure a more sustainable water supply by:

j) Further development of town storm water catchment, including evaporation and seepage control
k) Encourage use of rainwater tanks by the community.
l) Extended use of dish drains.
m) If sewage is ever implemented, initiate sewage recycling, recycled water to be reticulated on to parks and gardens
n) Desalination – demineralisation of bore water. Investigate new technology being used at Port Augusta with greenhouses.

***Flood***: over time, according to resources mitigate against the effects of flood by:

o) Increase the size of drains, to accommodate climate change threats
p) Raise the Cradock levee walls, ready for more extreme events, threatened by climate change
q) Create larger, deeper dam(s) for holding flood/stormwater near the current dam at Hawker and the storm water catchment at Quorn.

***Bushfire wildfire or village fire***: over time and according to resources, continue to mitigate for bushfire by:

r) Supporting the professional work of the Council Fire Protection Officer (FPO)
s) Applying all development controls rigorously
t) Monitoring grass length in and around town
u) Firebreaks as needed or required
v) Supporting and participating with the CFS

***Earthquake and Tremors***: over time and as resources allow, continue to mitigate for Earthquake and tremors by:

w) Applying existing building regulations and development controls rigorously
x) Participating in any State agency Earthquake risk awareness campaigns

***Heatwave***: over time and as resources allow, mitigate against Heatwave by:

y) Participating and supporting in kind, SES or Red Cross initiatives to raise awareness of heatwave risks.
z) Have water available for Council customers during summer, at the main office and the volunteers at Tourism information.
aa) Prepare and make staff aware of the high risk to elderly customers of heatwave events, and to look for signs of heat stress.
bb) Develop or maintain a risk reduction policy regarding heatwave especially with respect to the health and well-being of outdoor Council staff.

***Extreme weather including dust storms with potential radiation hazard***: over time and as resources allow, mitigate for extreme weather by

cc) Develop Council response plans for Council area clean ups
dd) Insist on a State funded baseline radiation test and subsequent tests every 5 years of dust and water supplies.
ee) Participate in ZEMC workshops and meetings

***Transport Disaster***: over time and as resources allow mitigate against a transport disaster by:

ff) Consider restricting the use of Quorn/Hawker by some size trucks. (Banning B Doubles and/or road trains from existing routes.
gg) Calculate the possibility of higher volumes of road transport as Olympic Dam, and any other mines nearby increase in size of operations.
hh) Assess the risk of radiological material, such as Uranium Ore, or other hazardous substances, being transported by road through Quorn.
ii) Consult with BHP regarding radiological hazard.

***Animal, Weed, Insect or Bird Plague:*** over time and as resources allow, mitigate for the effects of animal, bird or insect plague by:

jj) Increasing the number of apex predators, through encouraging breeding and habitat conservation.
kk) Work with PIRSA over time with regard to locust plague and any other animal threat to primary production or community health
ll) Engage in trapping, netting, culling, shooting, and scaring with gas gun and predator kites, and a range of techniques to keep Corellas manageable.
mm) Consult with Aboriginal elders over the traditional custom and practice regarding Corella control

**Note:** **As a general rule, in preparation for disaster events, and to ease the application process of submissions to the Local Government Disaster Fund, document and photograph all key Council assets at risk of any kind of damage from disaster events.**

**Participate in ZEMC planning.**

## STAKEHOLDERS

The following people and groups of people are stakeholders of this Plan.

***Table H***

**STAKEHOLDERS**

| |
|---|
| • **CERM Committee** |
| • **Emergency Service Agencies (including SAPOL)** |
| • **Council Elected Members** |
| • **Council Senior Leadership Team** |
| • **Community** |
| • **Associated emergency agency (ie health services)** |
| • **Business community** |
| • **Other relevant regional committees** |
| • **Non-Government Organisations** |
| • **ZEMC** |
| • **External agencies (i.e. LGA / SAFECOM)** |
| • **Major regional employer such as agriculture, tourism and agricultural services** |

# RISK REGISTER DISCLAIMER AND LOW CONFIDENCE LEVELS

Note:

The following pages are a risk register of potential natural and man-made disasters, developed based on scientific and historical evidence.

As NERAG and AS/NZS ISO 31000 require a group intelligence risk assessment and analysis processes, led by trained facilitators, all **CONFIDENCE LEVELS** of this risk register, **are** marked as **LOW**.

Low confidence means, other risk assessment data, such as that gathered at the ZEMC level, or a local CERM committee, as has been established by the Flinders Ranges Council should be applied, before this register is relied upon fully to make decisions.

Only after the local CERM Committee has fully reviewed and analysed the risks, should this disclaimer be removed.

## NERAG COMPLIANT RISK REGISTER

# Emergency Event Risk Register Part 1
# FLOOD

**Risk Register 1.1: Flood of the Council Area – Context of Risk Study**
***Table I***

| | | |
|---|---|---|
| | **DATE:** May 2014 | |
| **OBJECTIVE:** | Conduct an assessment of the risks to the Council community from inundation by torrential rain causing flood. The rain may likely either come from the north as part of post-cyclonic depression, or from the south west to west. | |
| **SCOPE:** | The assessment will address the risks associated from a flood, linked with a tempest arriving from any direction, while considering impacts to people and infrastructure in the Council area. The entire area of the Council will be studied. Storm and tempests to be considered are 1:5 year to 1:500 year events, taking into consideration Climate Change | |
| **STAKEHOLDERS** | Council and community. Coordination, control, response and recovery agencies such as SES and SAPOL | |
| **RISK CRITERIA** | NERAG consequence/likelihood tables, risk and evaluation tables | |
| **KEY ELEMENTS** | **SOURCE** | Post cyclonic rain depression. Overflowing creeks |
| | **IMPACTS** | Damage to Council roads and transport routes, infrastructure including sewage plants. Impacts on people including potential loss of life by driving through floodwater. Displacement of the communities. |
| | **VULNERABLE COMMUNITIES** | Extremely isolated communities and families on farms. Housing near creeks. Tourists. |
| **JUSTIFICATION** | It was resolved to consider a tempest of torrential rain causing inundation from a post cyclonic depression as in recent years these events have occurred. The focus on 1:5 year to 1:500 year events will allow us to consider the appropriateness of our measures. The sources of risk were limited to Tempest, as historical events have repeatedly flooded significant parts of the council area. Given the role of Council within state law and policy, the focus of the risk study is on infrastructure and systems processes such as roads and sewage, and the protection of Council citizens and their property mindful of affordability. | |

## Risk Register 1.2: Flood of the Council Area - Risk identification

***Table J***

| | Risk Identification | | | | |
|---|---|---|---|---|---|
| **Risk No.** | **Risk Statement** | **Source** | **Impact Category** | **Prevention/ Preparedness Controls** | **Recovery Response Controls** |
| 1 | There is a potential that tempest resulting from a post cyclonic rain depression will cause floods affecting the Council area, which in turn will cause failure of significant infrastructure and service delivery, specifically roads, sewage and rubbish collection. | Post cyclonic rain depression | Infrastructure, systems and processes | Flood-ways<br>Drains<br>Culverts<br>Drainage maintenance<br>Drainage design<br>Drain construction<br>Road maintenance<br>Emergency planning<br>ZEMC | Business continuity plan<br>ZEC<br>SAPOL<br>SES local and out of area units<br>Pumps<br>Generators<br>Council engineering crews<br>Graders<br>Bulldozer contractor |
| 2 | There is a potential that a tempest resulting from a post cyclonic rain depression will cause floods along creeks and watercourses, which in turn will cause an impact on the inhabitants | Post cyclonic rain depression | People | Building regulations<br>Drainage maintenance<br>Drainage design<br>Drain construction<br>Council Town Planning Flood-ways<br>Drains<br>Culverts<br>Road maintenance<br>Emergency planning<br>ZEMC | ZEC<br>SAPOL<br>SES local and out of area units<br>Council works crews<br>Graders<br>Bulldozer contractor<br>Business continuity plan<br>ZEC<br>SAPOL<br>SES local and out of area units<br>Pumps<br>Generators |

## Risk register 1.3: Flood of the Council Area – Risk analysis

***Table K***

| | Risk Analysis | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Level of Existing PP Controls** | **Level of Existing RR Controls** | **Consequence** | **Likelihood** | **Risk** | **Confidence Level** |
| 1 | RATING = 4/5 | RATING = 4/5 | Major | Possible | Medium | **LOW** |
| 2 | RATING = 4/5 | RATING = 4/5 | Moderate | Likely | Medium | **LOW** |

## Risk register 1.4: Flood of the Council Area – Risk evaluation

***Table L***

| | Risk Evaluation | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Tolerability** | **Treatment Strategies** | **Residual Consequence** | **Residual Likelihood** | **Residual Risk** | **Further Action** |
| 1 | Tolerable | Raise Cradock Levee<br>Consult with ZEMC over SES evacuation Centres<br>Education, particularly of tourists and locals, on the risks of flood crossing<br>Early Warning System | Minor | Rare | Low | Undertake an IWMP of both towns<br>Treatment required no further analysis. |
| 2 | Tolerable | Raise Cradock Levee<br>Consult with ZEMC on location of Evacuation Centres<br>Education of Tourists and locals on the risk of flood crossing<br>Early Warning System | Minor | Rare | Low | Undertake an IWMP of both Towns<br>Treatment required, no further analysis |

## Risk Register 1.5: Flood of the Council Area – Risk Matrix
***Table M***

| EVALUATIVE Matrix from NERAG<br>***Low Confidence Level*** | | Consequence Level | | | | |
|---|---|---|---|---|---|---|
| | | **Insignificant** | **Minor** | **Moderate** | **Major** | **Catastrophic** |
| **Likelihood Level** | **Almost Certain** | | | | | |
| | **Likely** | | | Risk 2 without treatment | | |
| | **Possible** | | | | Risk 1 without treatment | |
| | **Unlikely** | | | | | |
| | **Rare** | | Residual Risks 1 and 2 | | | |
| | **Very Rare** | | | | | |
| | **Almost Incredible** | | | | | |

| KEY | | |
|---|---|---|
| | | Intolerable, High Risk |
| | | Tolerable subject to ALARP, Medium Risk |
| | | Broadly acceptable, Low Risk |

# Emergency Event Risk Register Part 2

# HEATWAVE

**Risk Register 2.1: Heatwave – Context of risk study**

***Table N***

| | | |
|---|---|---|
| | **DATE:** May 2014 | |
| **OBJECTIVE:** | Conduct an assessment of the risks to the Council community from heatwave caused from a high pressure system usually emanating from the west, causing temperatures for 3 or more days of average 24 hourly temperatures above 32$^{O}$ Celsius. SES will warn of impending event | |
| **SCOPE:** | The assessment will address the risks associated from a heatwave, while considering impacts to people and infrastructure in the Council Area. The entire area of the Council will be studied. Heatwaves to be considered are 1:5 year to 1:100 year events, taking into consideration Climate Change | |
| **STAKEHOLDERS** | Council and community: Control, response and recovery agencies such as SES and Red Cross | |
| **RISK CRITERIA** | NERAG consequence/likelihood tables, risk and evaluation tables | |
| **KEY ELEMENTS** | **SOURCE** | High pressure system over South Australia. 3 days of average 24 hour temperature < 32$^{O}$ Celsius. |
| | **IMPACTS** | Damage to Council roads, outdoor staff, potential infrastructure including power. Impacts on vulnerable in community especially elderly. |
| | **VULNERABLE COMMUNITIES** | Elderly, Council outdoor staff, infirm and disabled Council clients. |
| **JUSTIFICATION** | It was resolved to consider a Heatwave caused by a high pressure system hovering above the state because in recent years these events have occurred. The focus on 1:5 year to 1:100 year events will allow us to consider the appropriateness of our measures. The sources of risk were limited to heatwave events, as these have been known to occur in summer. Given the role of Council within state law and policy, the focus of the risk study is on infrastructure, outdoor Council engineering crews and Council clients at risk. | |

## Risk Register 2.2: Heatwave - Risk identification
## Table O

| | Risk Identification | | | | |
|---|---|---|---|---|---|
| **Risk No.** | **Risk Statement** | **Source** | **Impact Category** | **Prevention/ Preparedness Controls** | **Recovery Response Controls** |
| 1 | There is a potential that heatwave will strike caused by a high pressure system hovering above the state. The heatwave will have an effect of the productivity of Council outdoor engineering staff and expose them to the danger of heat illnesses such as hyperthermia. Also exposed to the threat are Council customers. They may be some effect on council infrastructure. | High pressure system hovering over the state. Average daily temperature < $32^0$ Celsius for 3 or more days. | Infrastructure, systems and processes | Council heat policy<br>Business Continuity plan<br>SES Warnings<br>Red Cross | Council engineering<br>Utilities agencies<br>CFS, probable bushfire/wildfire catastrophic level |
| 2 | There is a potential that heatwave will strike caused by a high pressure system hovering above the state. The heatwave will have an effect of the productivity of Council outdoor engineering staff and expose them to the danger of heat illnesses such as hyperthermia. Also exposed to the threat are Council customers. They may be some effect on council infrastructure. There is an increased risk of violence, aggression and homicide. | High pressure system hovering over the state. Average daily temperature < $32^0$ Celsius for 3 or more days. | People | Council heat policy<br>Business Continuity plan<br>SES Warnings,<br>Red Cross<br>Emergency plan with dealing with violence a consideration. | Council First Aid<br>SES Warnings<br>Red Cross<br>SAPOL<br>First Aid<br>Health SA |

## Risk register 2.3: Heatwave in the Council Area – Risk analysis
***Table P***

| | Risk Analysis | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Level of Existing PP Controls** | **Level of Existing RR Controls** | **Consequence** | **Likelihood** | **Risk** | **Confidence Level** |
| 1 | RATING = 3.5/5 | RATING = 3/5 | Moderate | Likely | Tolerable | **LOW** |
| 2 | RATING = 3.5/5 | RATING = 3/5 | Moderate | Likely | Tolerable | **LOW** |

## Risk register 2.4: Heatwave in the Council Area – Risk evaluation
***Table Q***

| | Risk Evaluation | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Tolerability** | **Treatment Strategies** | **Residual Consequence** | **Residual Likelihood** | **Residual Risk** | **Further Action** |
| 1 | Tolerable | Water always available for Council customers<br>Council staff aware of potential heat stressed customers<br>Outdoor worker heat policy | Minor | Possible | Moderate | Review WHS UVR & Inclement Weather Procedure<br>Treatment required no further analysis. |
| 2 | Tolerable | Water always available for Council customers<br>Council staff aware of potential heat stressed customers<br>Outdoor worker heat policy | Minor | Possible | Moderate | Review WHS UVR & Inclement Weather Procedure<br><br>Treatment required no further analysis. |

## Risk Register 2.5: Heatwave in the Council Area – Risk matrix

***Table R***

| EVALUATIVE Matrix from NERAG<br><br>***Low Confidence Level*** | | Consequence Level | | | | |
|---|---|---|---|---|---|---|
| | | **Insignificant** | **Minor** | **Moderate** | **Major** | **Catastrophic** |
| **Likelihood Level** | **Almost Certain** | | | | | |
| | **Likely** | | | Untreated risks 1 and 2 | | |
| | **Possible** | | Treated residual risks 1 & 2 | | | |
| | **Unlikely** | | | | | |
| | **Rare** | | | | | |
| | **Very Rare** | | | | | |
| | **Almost Incredible** | | | | | |

| KEY | |
|---|---|
| | Intolerable, High Risk |
| | Tolerable subject to ALARP, Medium Risk |
| | Broadly acceptable, Low Risk |

# Emergency Event Risk Register Part 3
# BUSHFIRE, WILDFIRE OR VILLAGE FIRE

**Risk Register 3.1 Bushfire, wildfire or village fire – Context of risk study**
***Table S***

| | | |
|---|---|---|
| | **DATE: MAY 2014** | |
| **OBJECTIVE:** | Conduct an assessment of the risks to the Council community from bushfire. The bushfire may have diverse origins but also may occur on extreme or catastrophic fire days, aided by adverse weather conditions | |
| **SCOPE:** | The assessment will address the risks associated from a bushfire with a diverse aetiology, while considering impacts to people and infrastructure in the Council area. The entire area of the Council will be studied. The bushfire event to be considered is a 1:100 year event, taking into consideration climate change | |
| **STAKEHOLDERS** | Council and community. Fire Protection Officer. Coordination, control, response and recovery agencies such as CFS and SAPOL | |
| **RISK CRITERIA** | NERAG consequence/likelihood tables, risk and evaluation tables. ALARP. | |
| **KEY ELEMENTS** | **SOURCE** | Accidental, deliberate or lightning strike fire, perhaps starting in lightning attracting hills, and spreading to high fuel load grasslands after good seasons |
| | **IMPACTS** | Possible risk to volunteer CFS life, road closures, damage to council equipment, damage to tourist trade, reputation |
| | **VULNERABLE COMMUNITIES** | CFS volunteers, people with breathing difficulties, smoke inhalation, aged and infirm people, trapped tourists in natural tourist attractions. Houses on town limits and near trees. |
| **JUSTIFICATION** | It was resolved to consider a bushfire because the risk is ever present in the grasslands cereal crops and saltbush pasture especially after good seasons where fuel loads are higher. The focus on a 1:10 to 1:100 year events will allow us to consider the appropriateness of our measures. There is history and scientific evidence that bushfires have threatened in the past, and that Quorn and Hawker could be subjected to ember attack as well as smoke pollution. Given the existing settlements and infrastructure the focus is on people and infrastructure. The environment has evolved to deal with fire. | |

## Risk Register 3.2: Bushfire - Risk identification

***Table T***

| | Risk Identification | | | | |
|---|---|---|---|---|---|
| **Risk No.** | **Risk Statement** | **Source** | **Impact Category** | **Prevention / Preparedness Controls** | **Recovery Response Controls** |
| 1 | The is a potential for a bushfire with a diverse aetiology to start in isolated areas, move towards the towns with the prevailing winds along the grasslands/saltbush pasture, particularly after a good season, resulting in risk of ember attack and smoke inhalation. | Bushfire, wildfire or village fire grassfire with diverse causes | People | Professional CFS risk assessments.<br>Urban planning<br>Building regulation<br>Public Education CFS and Council<br>Early warning system<br>ZEMC<br>CFS Region committees<br>Emergency planning at state, region and local levels<br>Early warning systems<br>Fire barriers<br>Grass control<br>Fire hazard control<br>Fire Protection Officer | CFS volunteers and professionals from within the Council area, and all over the state<br>SA dept. natural resources<br>Business Continuity Plan<br>Council graders<br>Volunteer Organisations<br>Medical Services<br>ZEC<br>All agencies<br>Evacuation Arrangements<br>Volunteer Organisations<br>Medical services, hospital |
| 2 | The is a potential for a bushfire with a diverse aetiology to start in isolated areas, move towards the towns with the prevailing winds along the grasslands / saltbush pasture, particularly after a good season, resulting in risk of ember attack and smoke inhalation. | Bushfire, wildfire or village fire grassfire with diverse causes | Infrastructure | Professional CFS risk assessments.<br>Urban planning<br>Building regulation<br>Public Education CFS and Council<br>Early warning system<br>ZEMC<br>CFS Region committees<br>Emergency planning at State, region and local levels<br>Early warning systems<br>Fire barriers<br>Grass control<br>Fire hazard control<br>Fire Protection Officer | CFS volunteers from within the Council area, and all over the state<br>Business Continuity Plan<br>Council graders<br>Volunteer Organisations<br>Medical Services<br>ZEC<br>SA dept. natural resources<br>All agencies<br>Evacuation Arrangements<br>Volunteer Organisations<br>Medical services, hospital |

## Risk register 3.3: Bushfire – Risk analysis

**Table U**

| | Risk Analysis | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Level of Existing PP Controls** | **Level of Existing RR Controls** | **Consequence** | **Likelihood** | **Risk** | **Confidence Level** |
| 1 | RATING = 3.5/5 | RATING = 3.5/5 | Moderate | Likely | Medium | **Low** |
| 2 | RATING = 3.5/5 | RATING = 3.5/5 | Moderate | Likely | Medium | **Low** |

## Risk register 3.4: Bushfire – Risk evaluation

**Table V**

| | Risk Evaluation | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Tolerability** | **Treatment Strategies** | **Residual Consequence** | **Residual Likelihood** | **Residual Risk** | **Further Action** |
| 1 | Tolerable | Community Education<br>Support of the Council FPO<br>CEO attend ZEMC meetings | Moderate | Likely | Medium | CFS Zone 4 and ZEMC further assessment, analysis, expertise and information.<br>Lobby State Government to undertake bushfire mapping of Council Area |
| 2 | Tolerable | Community Education<br>Support of the Council FPO<br>CEO attend ZEMC meetings | Moderate | Likely | Medium | CFS Zone 4 and ZEMC further assessment, analysis, expertise and information.<br>Lobby State Government to undertake bushfire mapping of Council Area |

## Risk Register 3.5: Bushfire & Wildfire – Risk Matrix

***Table W***

| EVALUATIVE Matrix from NERAG<br><br>Low Confidence Level | | Consequence Level | | | | |
|---|---|---|---|---|---|---|
| | | Insignificant | Minor | Moderate | Major | Catastrophic |
| Likelihood Level | Almost Certain | | | | | |
| | Likely | | | Untreated risks 1 and 2. Also, treated residual risk, 1 and 2. | | |
| | Possible | | | | | |
| | Unlikely | | | | | |
| | Rare | | | | | |
| | Very Rare | | | | | |
| | Almost Incredible | | | | | |

| KEY | |
|---|---|
| | Intolerable, High Risk |
| | Tolerable subject to ALARP, Medium Risk |
| | Broadly acceptable, Low Risk |

# Emergency Event Risk Register Part 4
# EARTHQUAKE AND SUBSIDENCE

**Risk register 4.1: Earthquake and Subsidence - Context of risk study**
***Table X***

| | | |
|---|---|---|
| | **DATE: MAY 2014** | |
| **OBJECTIVE:** | Conduct an assessment of the risks to the Council community from earthquake and mining subsidence | |
| **SCOPE:** | The assessment will address the risks from an earthquake, associated with fault line and plate movement to the community and consider possible impacts to people, public administration, social setting, economy and infrastructure in the Council area. Earthquakes to be considered are 1:100 year and 1:500 year events | |
| **STAKEHOLDERS** | Council and community. ALL Coordination, control, response and recovery agencies such as SES, CFS and SAPOL, ZEC, ZEMC | |
| **RISK CRITERIA** | NERAG consequence/likelihood tables, risk and evaluation tables. ALARP | |
| **KEY ELEMENTS** | **SOURCE** | Geological earth shift from earthquake prone Flinders Ranges and associated faults. Mining activities. |
| | **IMPACTS** | Building damage, road damage, house collapse, multiple deaths, multiple injuries, |
| | **VULNERABLE COMMUNITIES** | Everyone within the community, particularly vulnerable the aged and infirm |
| **JUSTIFICATION** | It was resolved to consider an earthquake because the Flinders Ranges are prone to earth tremors, and there is in the historical record, significant earth tremors, further the consequences of a 1:500 year event could be catastrophic on many levels. Further, some mining has occurred in the district.<br>There is historical and scientific evidence that earthquakes have threatened in the past, and that Quorn, Cradock and Hawker could be destroyed. Given the existing settlements and infrastructure the focus is on people, public administration, economy, social setting and infrastructure. The environment will be impacted but consequences are low. | |

## Risk register 4.2: Earthquake and Subsidence - Risk identification

***Table Y***

| | Risk Identification | | | | |
|---|---|---|---|---|---|
| **Risk No.** | **Risk Statement** | **Source** | **Impact Category** | **Prevention / Preparedness Controls** | **Recovery Response Controls** |
| **1(a)**<br>**1(b)** | 1(a) There is a potential that an earthquake resulting from inter plate shift or fault line, will destroy communities in the Council Area<br>1(b) There is a potential that mine subsidence will affect people in the Council Area | Earthquake<br>Mine subsidence | People | 1(a)&(b) Emergency planning at Commonwealth, State, Zone and Local levels, Scientific particularly geological and social studies, Public education, Building regulation, Business continuity planning, ZEMC Mine mapping and Mine company communication | SAPOL, SES, CFS, SAAS, Health SA, Centrelink, Volunteers, NGO organisations,<br>ZEC, Local Government as functional service, Housing SA |
| **2(a)**<br>**2(b)** | 2(a) There is a potential that an earthquake resulting from inter plate shift or fault line, will destroy the economy in the Council Area<br>2(b) There is a potential that mine subsidence will affect the economy in the Council Area | Earthquake<br>Mine subsidence | Economy | 2(a)&(b) Emergency planning at Commonwealth, State, Zone and Local levels, Scientific particularly geological and social studies, Public education, Building regulation, Business continuity planning, ZEMC Mine mapping and Mine company communication | LGA Risk Services<br>Commonwealth<br>State<br>ZEC<br>Local Government |
| **3(a)**<br>**3(b)** | 3(a) There is a potential that an earthquake resulting from inter plate shift or fault line, will affect the public administration in the Council Area<br>3(b) There is a potential that mine subsidence will affect public administration in the Council Area | Earthquake<br>Mine subsidence | Public Administration | 3(a)&(b) Emergency planning at Commonwealth, State, Zone and Local levels, Scientific particularly geological and social studies, Public education, Building regulation, Business continuity planning, ZEMC Mine mapping and Mine company communication | LGA, SA State Government, Commonwealth Government<br>ZEC<br>Local Government |
| **4(a)**<br>**4(b)** | 4(a)There is a potential that an earthquake resulting from inter plate shift or fault line, will affect the social setting in the Council Area<br>4(b) There is a that mine subsidence will affect the social setting in the Council Area | Earthquake<br>Mine subsidence | Social Setting | 4(a)&(b) Emergency planning at Commonwealth, State, Zone and Local levels, Scientific particularly geological and social studies, Public education, Building regulation, Business continuity planning, ZEMC Mine mapping and Mine company communication | SAPOL, Social Services Housing SA, Volunteer, NGO organisations, ZEC |
| **5(a)**<br>**5(b)** | 5(a) There is a potential that an earthquake resulting from inter plate shift or fault line, will destroy infrastructure in the Council Area<br>5(b) There is a potential that mine subsidence will affect infrastructure in the Council Area | Earthquake<br>Mine subsidence | Infrastructure | 5(a)&(b) Emergency planning at Commonwealth, State, Zone and Local levels, Scientific particularly geological and social studies, Public education, Building regulation, Business continuity planning, ZEMC. Mine mapping and Mine company communication | Council, State, Commonwealth<br>DTEI. ZEC, Local Government<br>LGA insurance |

## Risk register 4.3: Earthquake and Subsidence - Risk analysis

***Table Z***

| | Risk Analysis | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Level of Existing PP Controls** | **Level of Existing RR Controls** | **Consequence** | **Likelihood** | **Risk** | **Confidence Level** |
| **1(a)**<br>**1(b)** | 1(a) RATING = 2.5/5<br>1(b) RATING = 4/5 | 1(a) RATING = 2.5/5<br>1(b) RATING = 4.5/5 | 1(a) Major<br>1(b) Minor | 1(a) & (b) Unlikely | 1(a) Medium<br>1(b) Medium | **LOW** |
| **2(a)**<br>**2(b)** | 2(a) RATING = 2.5/5<br>2(b) RATING = 4/5 | 2(a) RATING = 2.5/5<br>2(b) RATING = 4.5/5 | 1(a) Major<br>1(b) Minor | 2(a) & (b) Unlikely | 2(a) Medium<br>2(b) Medium | **LOW** |
| **3(a)**<br>**3(b)** | 3(a) RATING = 2.5/5<br>3(b) RATING = 4/5 | 3(a) RATING = 2.5/5<br>3(b) RATING = 4.5/5 | 1(a) Major<br>1(b) Minor | 3(a) & (b) Unlikely | 3(a) Medium<br>3(b) Medium | **LOW** |
| **4(a)**<br>**4(b)** | 4(a) RATING = 2.5/5<br>4(b) RATING = 4/5 | 4(a) RATING = 2.5/5<br>4(b) RATING = 4.5/5 | 4(a) Moderate<br>4(b) Insignificant | 4(a) & (b) Unlikely | 4(a) Medium<br>4(b) Low | **LOW** |
| **5(a)**<br>**5(b)** | 5(a) RATING = 2.5/5<br>5(b) RATING = 4/5 | 5(a) RATING = 2.5/5<br>5(b) RATING = 4.5/5 | 1(a) Major<br>1(b) Minor | 5(a) & (b) Unlikely | 5(a) Medium<br>5(b) Medium | **LOW** |

## Risk register 4.4: Earthquake and Subsidence – Risk evaluation

***Table AA***

| | Risk Evaluation | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Tolerability** | **Treatment Strategies** | **Residual Consequence** | **Residual Likelihood** | **Residual Risk** | **Further Action** |
| **1(a)**<br>**1(b)** | 1(a) Tolerable<br>1(b) Tolerable | Education<br>More scientific geology<br>Improved evacuation centres and ZEMC Local Government coordination | 1(a) Major<br>1(b) Minor | 1(a) & (b) Unlikely | 1(a) Medium<br>1(b) Medium | Further analysis, assessment, scientific geology and evaluation required |
| **2(a)**<br>**2(b)** | 2(a) Tolerable<br>2(b) Tolerable | Education<br>More scientific geology<br>Improved evacuation centres and ZEMC Local Government coordination | 1(a) Major<br>1(b) Minor | 2(a) & (b) Unlikely | 2(a) Medium<br>2(b) Medium | Further analysis, assessment, scientific geology and evaluation required |
| **3(a)**<br>**3(b)** | 3(a) Tolerable<br>3(b) Tolerable | Education<br>More scientific geology<br>Improved evacuation centres and ZEMC Local Government coordination | 1(a) Major<br>1(b) Minor | 3(a) & (b) Unlikely | 3(a) Medium<br>3(b) Medium | Further analysis, assessment, scientific geology and evaluation required |
| **4(a)**<br>**4(b)** | 4(a) Tolerable<br>4(b) Acceptable | Education<br>More scientific geology<br>Improved evacuation centres and ZEMC local government coordination | 4(a) Moderate<br>4(b) Insignificant | 4(a) & (b) Unlikely | 4(a) Medium<br>4(b) Low | Further analysis, assessment, scientific geology and evaluation required |
| **5(a)**<br>**5(b)** | 5(a) Tolerable<br>5(b) Tolerable | Education<br>More scientific geology<br>Improved evacuation centres and ZEMC local government coordination | 1(a) Major<br>1(b) Minor | 5(a) & (b) Unlikely | 5(a) Medium<br>5(b) Medium | Further analysis, assessment, scientific geology and evaluation required |

## Risk Register 3.5: Earthquake and Subsidence – Risk Matrix
***Table AB***

| EVALUATIVE Matrix from NERAG<br>***Low Confidence Level*** | | CONSEQUENCE LEVEL | | | | |
|---|---|---|---|---|---|---|
| | | **Insignificant** | **Minor** | **Moderate** | **Major** | **Catastrophic** |
| LIKELIHOOD LEVEL | **Almost Certain** | | | | | |
| | **Likely** | | | | | |
| | **Possible** | | | | | |
| | **Unlikely** | Untreated and treated residual risk 4(b) | Untreated risks 1(b), 2(b), 3(b), 5(b) | Untreated Risk 4(a) | Untreated Risks,1(a),2(a),3(a),5(a) | |
| | **Rare** | | | Treated residual risk 4(a) | Treated residual risks,1(a),2(a),3(a),5(a) | |
| | **Very Rare** | | | | | |
| | **Almost Incredible** | | | | | |

| KEY | | |
|---|---|---|
| | | Intolerable, High Risk |
| | | Tolerable subject to ALARP, Medium Risk |
| | | Broadly acceptable, Low Risk |

# Emergency Event Risk Register Part 5

# STORM DAMAGE WITH OR WITHOUT RADIATION HAZARD

**Risk register 5.1: Storm damage, including dust storms, with or without radiation hazard - Context of risk study**

***Table AC***

| | | | |
|---|---|---|---|
| | **DATE: MAY 2014** | | |
| **OBJECTIVE:** | Conduct an assessment of the risks to the Council community from Storm Damage including dust storms | | |
| **SCOPE:** | The assessment will address the risks from storm damage, associated with a likely south western to western origin tempest, to the local community and consider possible impacts to people and infrastructure in the Council area. Storm and tempest to be considered are 1:10 year to 1:100 year events. Taking into consideration climate change. This particular scope statement includes dust storms, potentially carrying radioactive material from Olympic Dam. | | |
| **STAKEHOLDERS** | Council and community. Coordination, control, response and recovery agencies such as SES and SAPOL, ZEC, ZEMC, NGOs and social services, Building Inspectors. BHP Billiton. | | |
| **RISK CRITERIA** | NERAG consequence/likelihood tables, risk and evaluation tables | | |
| **KEY ELEMENTS** | **SOURCE** | High winds generated from a south to south westerly low. Dust storm Westerly to North Westerly wind. | |
| | **IMPACTS** | Tree damage, building damage, power lines down, possible houses destroyed. Council crews required for storm damage repair | |
| | **VULNERABLE COMMUNITIES** | Elderly, uninsured, frail, disabilities, those with breathing difficulties | |
| **JUSTIFICATION** | It was resolved to consider storm damage, including dust storms, as there is some indication in the historical record and the enlargement of Olympic Dam mine has been mentioned as a risk. The consequences are moderate to minor, but with climate change this situation could change in the future. 1:10 and 1:100 year events were considered. Given the existing settlements and infrastructure the focus is on people, social setting and infrastructure. The environment will be impacted but consequences are low. However, dust storms, with radioactive material, would be rare to very rare the consequence is major to catastrophic. | | |

## Risk register 5.2: Storm Damage, including Dust Storms - Risk Identification
***Table AD***

| | Risk Identification | | | | |
|---|---|---|---|---|---|
| **Risk No.** | **Risk Statement** | **Source** | **Impact Category** | **Prevention / Preparedness Controls** | **Recovery Response Controls** |
| 1 | There is a potential that a high wind storm, including a dust storm, will impact the people of the Council area. A dust storm has potential to carry radioactive material. | Low pressure system from the north west. Desert storm collecting dust. Potential dust storm originating in the Roxby Downs/Olympic dam area. | People | Commonwealth, State, regional and local emergency plans.<br>Early warning systems, BOM, BHP Billiton, ZEMC | State Natural Resource Agencies including Agriculture, (Local and inter and intra-state units) All EM Agencies, Health SA, Council as functional service, ZEC |
| 2 | There is a potential that a high wind storm, including a dust storm, will impact the social setting including resilience of the Council area A dust storm has potential to carry radioactive material. | Low pressure system from the north west, west or south west. Desert storm collecting dust. Potential dust storm originating in the Roxby Downs/Olympic dam area. | Environment | Commonwealth, State, regional and local emergency plans.<br>Early warning systems, BOM, BHP Billiton, ZEMC | State Natural Resource Agencies including Agriculture, (Local and inter and intra-state units) All EM Agencies, Health SA, Council as functional service, ZEC |
| 3 | There is a potential that a high wind storm, including a dust storm, will impact the infrastructure of the Council area, including verge trees and parks and gardens. A dust storm has potential to carry radioactive material. | Low pressure system from the south, west or south west. Desert storm collecting dust. Potential dust storm originating in the Roxby Downs/Olympic dam area. | Infrastructure | Commonwealth, State, regional and local emergency plans.<br>Early warning systems, BOM, BHP Billiton, ZEMC | State Natural Resource Agencies including Agriculture, (Local and inter and intra-state units) All EM Agencies, Health SA, Council as functional service, ZEC |

## Risk register 5.3: Storm damage, including dust storms – Risk analysis
***Table AE***

| | Risk Analysis | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Level of Existing PP Controls** | **Level of Existing RR Controls** | **Consequence** | **Likelihood** | **Risk** | **Confidence Level** |
| **1(a) without radiation**<br>**1(b) with radiation** | (a) RATING = 4/5 without radiation<br>(b) RATING = 1/5 with radiation | (a) RATING = 4/5 without radiation<br>(b) RATING = 1/5 with radiation | (a) Minor without radioactive materiel<br>(b) Catastrophic, with radioactive materiel | (a) Likely without radioactive materiel<br>(b) Unlikely, with radioactive materiel | (a) Medium<br>(b) High | **(A) LOW**<br>**(B) LOW** |
| **2(a) without radiation**<br>**2(b) with radiation** | (a) RATING = 4/5 without radiation<br>(b) RATING = 1/5 with radiation | (a) RATING = 4/5 without radiation<br>(b) RATING = 1/5 with radiation | (a) Minor without radioactive materiel<br>(b) Catastrophic, with radioactive materiel | (a) Likely without radioactive materiel<br>(b) Unlikely, with radioactive materiel | (a) Medium<br>(b) High | **(A) LOW**<br>**(B) LOW** |
| **3(a) without radiation**<br>**3(b) with radiation** | (a) RATING = 4/5 without radiation<br>(b) RATING = 1/5 with radiation | (a) RATING = 4/5 without radiation<br>(b) RATING = 1/5 with radiation | (a) Minor without radioactive materiel<br>(b) Catastrophic, with radioactive materiel | (a) Likely without radioactive materiel<br>(b) Unlikely, with radioactive materiel | (a) Medium<br>(b) High | **(A) LOW**<br>**(B) LOW** |

## Risk register 5.4: Storm damage, including dust storms with or without radiation hazard- Risk evaluation
***Table AF***

| | Risk Evaluation | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Tolerability** | **Treatment Strategies** | **Residual Consequence** | **Residual Likelihood** | **Residual Risk** | **Further Action** |
| **1(a) without radiation**<br>**1(b) with radiation** | (c) Tolerable<br>(d) Intolerable | (a) Train Council crews in tree storm damage and chainsaw.<br>(b) Baseline radioactivity monitoring of Council Area. More information from BHP Billiton and independent scientific sources | (a) Insignificant<br>(b) Catastrophic with radioactive dust | (a) Likely<br>(b) Unlikely with radioactive dust | (a) Moderate<br>(b) high | (a) Tolerable subject to ALARP, apply treatments, no further analysis<br>(b) Further analysis required. Scientific risk studies and baseline radiation measurement |
| **2(a) without radiation**<br>**2(b) with radiation** | (a) Tolerable<br>(b) Intolerable | (a) Train Council crews in tree storm damage and chainsaw.<br>(b) Baseline radioactivity monitoring of Council Area. More information from BHP Billiton and independent scientific sources | (a) Insignificant<br>(b) Catastrophic with radioactive dust | (a) Likely<br>(b) Unlikely with radioactive dust | (a) Moderate<br>(b) High | (a) Tolerable subject to ALARP, apply treatments, no further analysis<br>(b) (b) Further analysis required. Scientific risk studies and baseline radiation measurement |
| **3(a) without radiation**<br>**3(b) with radiation** | (a) Tolerable<br>(b) Intolerable | (a) Train Council crews in tree storm damage and chainsaw.<br>(b) Baseline radioactivity monitoring of Council Area. More information from BHP Billiton and independent scientific sources | (a) Insignificant<br>(b) Catastrophic with radioactive dust | (a) Likely<br>(b) Unlikely with radioactive dust | (a) Moderate<br>(b) High | (a) Tolerable subject to ALARP, apply treatments, no further analysis<br>(b) Further analysis required. Scientific risk studies and baseline radiation measurement |

## Risk register 5.5: Storm damage, including dust storms with or without radiation hazard - Risk evaluation

***Table AG***

| EVALUATIVE Matrix from NERAG<br><br>Low Confidence Level | | Consequence Level | | | | |
|---|---|---|---|---|---|---|
| | | Insignificant | Minor | Moderate | Major | Catastrophic |
| Likelihood Level | Almost Certain | | | | | |
| | Likely | Treated residual risks 1(a), 2(a) & 3(a) without radiation | Untreated risks 1(a), 2(a) & 3(a) without radiation. | | | |
| | Possible | | | | | |
| | Unlikely | | | | | Untreated risks, 1(b), 2(b), 2(c) with radiation. Treated residual risks, 1(b), 2(b), 2(c) with radiation |
| | Rare | | | | | |
| | Very Rare | | | | | |
| | Almost Incredible | | | | | |

| KEY | | |
|---|---|---|
| | | Intolerable, High Risk |
| | | Tolerable subject to ALARP, Medium Risk |
| | | Broadly acceptable, Low Risk |

# Emergency Event Risk Register Part 6

# TRANSPORT DISASTER WITH OR WITHOUT RADIATION HAZARD

**Risk register 6.1: Transport Disaster with or without radiation hazard - Context of Risk Study**
***Table AH***

| | | |
|---|---|---|
| | **DATE: MAY 2014** | **TEAM:** |
| **OBJECTIVE:** | Conduct an assessment of the risks to the Council community from a major Transport disaster. | |
| **SCOPE:** | The assessment will address the risks from a major transport disaster, associated with, railway failure, driver failure or road failure, to the local community and consider possible impacts to people and infrastructure in the Council area, with or without a radiation hazard. Transport accidents to be considered include 1:5 year and 1:100 year events. | |
| **STAKEHOLDERS** | Council, community, SAPOL, SA Ambulance, Hospital, CFS, DPTI, Rail and road freight carriers, BHP Billiton, regulators and enforcers. Ecological considerations. | |
| **RISK CRITERIA** | NERAG consequence/likelihood tables, risk and evaluation tables | |
| **KEY ELEMENTS** | **SOURCE** | Driver failure or road failure |
| | **IMPACTS** | Cars, trucks, infrastructure, buses or trains destroyed, fire, rescue, fatalities, HAZMAT and radiation hazard. |
| | **VULNERABLE COMMUNITIES** | Tourists |
| **JUSTIFICATION** | It was resolved to consider a transport disaster because the Council Area is dependent on tourist trade whose means of transportation include, bus, rail or private vehicles. 1:5 and 1:100 year events were considered. There is scientific evidence that major transport disasters could happen, and some have happened in the past indicated by the historic record. As mine sites in the state develop, especially at Olympic Dam, the likelihood of radiological hazard from uranium ore increases, as well other HAZMAT transported by road. Given the existing settlements and infrastructure the focus is on people, economy, and infrastructure. The risk to the environment, public administration and social setting is low. However, the risk to environmental/ecological, public administration and social setting of radiological hazard has major to catastrophic consequences. | |

## Risk Register 6.2: Transport Disaster with or without radiation hazard - Risk Identification

***Table AI***

| | Risk Identification | | | | |
|---|---|---|---|---|---|
| **Risk No.** | **Risk Statement** | **Source** | **Impact Category** | **Prevention/ Preparedness Controls** | **Recovery Response Controls** |
| **1(a) 1(b)** | There is a potential that a transport calamity will impact people especially tourists, causing fatalities, disease and serious injuries.<br>(a) Without radiation hazard<br>(b) With radiation hazard | Driver, infrastructure or engineering failure, Railway, Road, Train, Bus, Truck, Car, Cycle, Grey Nomads, Caravaners, tourists, cyclists. Increased road traffic | People | SAPOL, State plans, ZEMC plans, DPTI, Tourism operators, Pichi Richi Railway, BHP Billiton. Road, rail, legislation – regulation, agencies authorities and enforcement. Planning, engineered mitigation | SAPOL, CFS, SES, SA Ambulance, BHP Billiton, Hospital, Health SA, Local Government as functional service, Pichi Richi Railway, Tourism operators |
| **2(a) 2(b)** | There is a potential that a transport calamity will impact the economy of the Council Area, causing serious economic loss and loss of reputation, especially in the area of tourism and agriculture<br>(a) Without radiation hazard<br>(b) With radiation hazard | Driver, infrastructure or engineering failure, Railway, Road, Train, Bus, Truck, Car, Cycle, Grey Nomads, Caravaners, tourists, cyclists. Increased road traffic | Economy | SAPOL, State plans, ZEMC plans, DPTI, Tourism operators, Pichi Richi Railway, BHP Billiton. Road, rail, legislation – regulation, agencies authorities and enforcement. Planning, engineered mitigation | SAPOL, CFS, SES, SA Ambulance, BHP Billiton, Hospital, Health SA, Local Government as functional service, Pichi Richi Railway, Tourism operators |
| **3(a) 3(b)** | There is a potential that a transport calamity will impact upon Council infrastructure<br>(a) Without radiation hazard<br>(b) With radiation hazard | Driver, infrastructure or engineering failure, Railway, Road, Train, Bus, Truck, Car, Cycle, Grey Nomads, Caravaners, tourists, cyclists. Increased road traffic | Infrastructure | SAPOL, State plans, ZEMC plans, DPTI, Tourism operators, Pichi Richi Railway, BHP Billiton. Road, rail, legislation – regulation, agencies authorities and enforcement. Planning, engineered mitigation | SAPOL, CFS, SES, SA Ambulance, BHP Billiton, Hospital, Health SA, Local Government as functional service, Pichi Richi Railway, Tourism operators |
| **4(a) 4(b)** | There is a potential that a transport calamity will impact upon the environment/ecology of the Council area with hazardous materials also affecting the health of the community<br>(a) Without radiation hazard<br>(b) With radiation hazard | Driver, infrastructure or engineering failure, Railway, Road, Train, Bus, Truck, Car, Cycle, Grey Nomads, Caravaners, tourists, cyclists. Increased road traffic | Environment/Ecology | SAPOL, State plans, ZEMC plans, DPTI, Tourism operators, Pichi Richi Railway, BHP Billiton. Road, rail, legislation – regulation, agencies authorities and enforcement. Planning, engineered mitigation | SAPOL, CFS, SES, SA Ambulance, BHP Billiton, Hospital, Health SA, Local Government as functional service, Pichi Richi Railway, Tourism operators |

## Risk Register 6.3 Transport Disaster with or without radiation hazard - Risk Analysis

***Table AJ***

| | Risk Analysis | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Level of Existing PP Controls** | **Level of Existing RR Controls** | **Consequence** | **Likelihood** | **Risk** | **Confidence Level** |
| **1(a) 1(b)** | (a) RATING = without radiation Hazard 4/5<br>(b) RATING = with radiation hazard 1/5 | RATING = without radiation hazard 2/5<br>RATING = with radiation hazard 1/5 | (a) Without radiation hazard: MAJOR<br>(b) With radiation hazard: CATASTROPHIC | (a) Without radiation hazard: POSSIBLE<br>(b) With radiation hazard: RARE | (a) Without radiation hazard: HIGH<br>(b) With radiation hazard: MEDIUM | **LOW** |
| **2(a) 2(b)** | (a) RATING = without radiation hazard 4/5<br>(b) RATING = with radiation hazard 1/5. | (a) RATING = without radiation hazard 2/5<br>(b) RATING = with radiation hazard 1/5 | (a) Without radiation hazard: MAJOR<br>(b) With radiation hazard: CATASTROPHIC | (a) Without radiation hazard: POSSIBLE<br>(b) With radiation hazard: RARE | (a) Without radiation hazard: HIGH<br>(b) With radiation hazard: MEDIUM | **LOW** |
| **3(a) 3(b)** | (a) RATING = without radiation Hazard 3/5<br>(b) RATING = with radiation hazard 1/5. | (a) RATING = without radiation hazard 3/5<br>(b) With radiation hazard 0.5/5 | (a) Without radiation hazard: MODERATE<br>(b) With radiation hazard: CATASTROPHIC | (a) Without radiation hazard: POSSIBLE<br>(b) With radiation hazard: VERY RARE | (a) Without radiation hazard: MEDIUM<br>(b) With radiation hazard: MEDIUM | **LOW** |
| **4(a) 4(b)** | (a) RATING = without radiation Hazard 4/5<br>(b) RATING = with radiation hazard 1/5. | (a) RATING = without radiation hazard 2/5<br>(b) RATING = with radiation hazard 0.5/5 | (a) Without radiation hazard: MAJOR<br>(b) With radiation hazard: CATASTROPHIC | (a) Without radiation hazard: POSSIBLE<br>(b) With radiation hazard: UNLIKELY | (a) Without radiation hazard: HIGH<br>(b) With radiation hazard: HIGH | **LOW** |

## Risk Register 6.4: Transport Disaster with or without radiation hazard - Risk Evaluation
***Table AK***

| | Risk Evaluation | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Tolerability** | **Treatment Strategies** | **Residual Consequence** | **Residual Likelihood** | **Residual Risk** | **Further Action** |
| **1(a)**<br>**1(b)** | (a) Without radiation hazard: INTOLERABLE<br>(b) With radiation hazard: TOLERABLE | Both risks (a) and (b) Consult and research risks with: SAPOL, DPTI, BHP Billiton, Pichi Richi Railway, Transport law enforcement/risk management. Education or grey nomads. ZEMC Participation. Baseline radiation level measurement | (a) Without radiation hazard: MAJOR<br>(b) With radiation hazard: CATASTROPHIC | (a) Without radiation hazard: POSSIBLE<br>(b) With radiation hazard: RARE | (a) Without radiation hazard: HIGH<br>(b) With radiation hazard: MEDIUM | Further risk assessment research, negotiation and analysis required. |
| **2(a)**<br>**2(b)** | (a) Without radiation hazard: INTOLERABLE<br>(b) With radiation hazard: TOLERABLE | Both risks (a) and (b) Consult and research risks with: SAPOL, DPTI, BHP Billiton, Pichi Richi Railway, Transport law enforcement/risk management. Education or grey nomads. ZEMC Participation Baseline radiation level measurement | (a) Without radiation hazard: MAJOR<br>(b) With radiation hazard: CATASTROPHIC | (a) Without radiation hazard: POSSIBLE<br>(b) With radiation hazard: RARE | (a) Without radiation hazard: HIGH<br>(b) With radiation hazard: MEDIUM | Further risk assessment research, negotiation and analysis required. |
| **3(a)**<br>**3(b)** | (a) Without radiation hazard: TOLERABLE<br>(b) With radiation hazard: TOLERABLE | Both risks (a) and (b) Consult and research risks with: SAPOL, DPTI, BHP Billiton, Pichi Richi Railway, Transport law enforcement/risk management. Education or grey nomads. ZEMC Participation Baseline radiation level measurement | (a) Without radiation hazard: MODERATE<br>(b) With radiation hazard: CATASTROPHIC | (a) Without radiation hazard: POSSIBLE<br>(b) With radiation hazard: VERY RARE | (a) Without radiation hazard: MEDIUM<br>(b) With radiation hazard: MEDIUM | Further risk assessment research, negotiation and analysis required. |
| **4(a)**<br>**4(b)** | (a) Without radiation hazard: INTOLERABLE<br>(b) With radiation hazard: TOLERABLE | Both risks (a) and (b) Consult and research risks with: SAPOL, DPTI, BHP Billiton, Pichi Richi Railway, Transport law enforcement/risk management. Education or grey nomads. ZEMC Participation Baseline radiation level measurement | (a) Without radiation hazard: MAJOR<br>(b) With radiation hazard: CATASTROPHIC | (a) Without radiation hazard: POSSIBLE<br>(b) With radiation hazard: UNLIKELY | (a) Without radiation hazard: HIGH<br>(b) With radiation hazard: MEDIUM | Further risk assessment research, negotiation and analysis required. |

## Risk Register 6.5: Transport Disaster with or without radiation hazard - Risk Matrix
***Table AL***

| EVALUATIVE Matrix from NERAG<br><br>Low Confidence Level | | Consequence Level | | | | |
|---|---|---|---|---|---|---|
| | | Insignificant | Minor | Moderate | Major | Catastrophic |
| Likelihood Level | Almost Certain | | | | | |
| | Likely | | | | | |
| | Possible | | | Risk 3(a), untreated, no radiation hazard. Risk 3(a), residual, treated, no radiation hazard | 1(a), 2(a), 4(a) untreated, no radiation hazard. 1(a), 2(a), 4(a) Treated, residual, no radiation hazard. | |
| | Unlikely | | | | 4(b) untreated with radiation hazard. 4(b) treated, residual, with radiation hazard. | |
| | Rare | | | | | 1(b), 2(b) untreated, with radiation hazard. 1(b),2(b) treated, residual,, with radiation hazard |
| | Very Rare | | | | | 3(b) untreated with radiation hazard, 3(b) untreated with radiation hazard |
| | Almost Incredible | | | | | |

| KEY | |
|---|---|
| | Intolerable, High Risk |
| | Tolerable subject to ALARP, Medium Risk |
| | Broadly acceptable, Low Risk |

# Emergency Event Risk Register Part 7

# ANIMAL, BIRD OR INSECT PLAGUE

**Risk Register 7.1: Animal, Bird or Insect Plague - Context of Risk Study**
***Table AM***

| | | |
|---|---|---|
| | **DATE: MAY 2014** | |
| **OBJECTIVE:** | Conduct an assessment of the risks to the Council community from pest animals, birds and insects in plague proportions. | |
| **SCOPE:** | The assessment will address the risks from animal, bird or insect plague, associated with ecological and agricultural factors, to the local community and consider possible impacts to people and infrastructure in the Council area. Pestilence events to be considered are 1:10 year and 1:100 year events | |
| **STAKEHOLDERS** | Council and community, PIRSA, DENR, Animal Welfare groups, SAPOL, Hunting Clubs | |
| **RISK CRITERIA** | NERAG consequence/likelihood tables, risk and evaluation tables | |
| **KEY ELEMENTS** | **SOURCE** | Ecological/environmental and evolutionary. Rapid breeding of Galahs, Corellas, Locusts, Grasshoppers or other non-threatened or feral species. |
| | **IMPACTS** | Farmers, Trees, Community. |
| | **VULNERABLE COMMUNITIES** | Farmers, trees, parkland, housing. |
| **JUSTIFICATION** | It was resolved to consider the threat of rapid breeding of Galahs, Corellas, Locusts, Grasshoppers or other non-threatened or feral species, because the Council area has some significant farming land, and the destructive habits of the species to trees, other plants, crops, housing as well as acknowledging Council responsibility and required assistance in the handling the dispatch of the pests.1:10 to 1:100 year events were considered. There is scientific and historical evidence that bird plagues have occurred in the district. Given the existing settlements and infrastructure the focus is on people, public administration, economy and environment. The risk to the social setting is low | |

## Risk Register 7.2: Animal, Bird or Insect Plague - Risk Identification
***Table AN***

| | Risk Identification | | | | |
|---|---|---|---|---|---|
| **Risk No.** | **Risk Statement** | **Source** | **Impact Category** | **Prevention / Preparedness Controls** | **Recovery Response Controls** |
| **1(a) Birds<br>1(b) Insects<br>1(c) Other pests** | There is a potential for the rapid breeding and deployment of pest species such as Galahs, Corellas, Locusts, Grasshoppers, and other non-threatened or feral animals, impacting on farmers, community and the environment. Crops, such as cereals and fruits can be damaged, by birds and insects, livestock can be predated upon by feral dogs. | Evolutionary/biological and ecological sources, rapid breeding, lack of apex predators. Greater access to water and food near settlements and cultivated land. | Economy | Risks 1(a), 1(b) & 1(c), Local Government emergency planning<br>PIRSA Planning | 1(a) None for birds<br>1(b)Poisoning of insect pests<br>1(c) Vertebrate & mammal control provisions, culling, shooting |
| **2(a) Birds<br>2(b) Insects<br>2(c) Other pests** | There is a potential for the rapid breeding and deployment of pest species such as Galahs, Corellas, Locusts, Grasshoppers, and other non-threatened or feral animals, impacting on farmers, community and the environment. People will be adversely affected by damage to their gardens. Some will be traumatised by cull programs. | Evolutionary/biological and ecological sources, rapid breeding, lack of apex predators. Greater access to water and food near settlements and cultivated land. | People | Risks 2(a), 2(b) & 2(c), Local Government emergency planning<br>PIRSA Planning | 1(a) None for birds<br>1(b)Poisoning of insect pests<br>1(c) Vertebrate & mammal control provisions, culling, shooting |
| **3(a) Birds<br>3(b) Insects<br>3(c) Other pests** | There is a potential for the rapid breeding and deployment of pest species such as Galahs, Corellas, Locusts, Grasshoppers, and other non-threatened or feral animals, impacting on farmers, community and the environment. The environment will be affected by an increase in disease, parasites, damage to trees and other food sources, fouling of water sources, guano increases. | Evolutionary/biological and ecological sources, rapid breeding, lack of apex predators. Greater access to water and food near settlements and cultivated land. | Environment | Risks 3(a), 3(b) & 3(c), Local Government emergency planning<br>PIRSA Planning | 1(a) None for birds<br>1(b)Poisoning of insect pests<br>1(c) Vertebrate & mammal control provisions, culling, shooting |
| **4(a) Birds<br>4(b) Insects<br>4(c) Other pests** | There is a potential for the rapid breeding and deployment of pest species such as Galahs, Corellas, Locusts, Grasshoppers, and other non-threatened or feral animals, impacting on farmers, community and the environment. Public admin will be exposed to adverse media risk, protests. | Evolutionary/biological and ecological sources, rapid breeding, lack of apex predators. Greater access to water and food near settlements and cultivated land. | Public Administration | Risks 4(a), 4(b) & 4(c), Local Government emergency planning<br>PIRSA Planning | 1(a) None for birds<br>1(b)Poisoning of insect pests<br>1(c) Vertebrate & mammal control provisions, culling, shooting |

## Risk Register 7.3: Animal, Bird or Insect Plague - Risk Analysis
***Table AO***

| | Risk Analysis | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Level of Existing PP Controls** | **Level of Existing RR Controls** | **Consequence** | **Likelihood** | **Risk** | **Confidence Level** |
| **1(a) Birds<br>1(b) Insects<br>1(c) Other pests** | 1(a) RATING = 1/5<br>1(b) RATING =3.5/5<br>1(c) RATING = 2.5/5 | 1(a) RATING = 1/5<br>1(b) RATING =3.5/5<br>1(c) RATING = 2.5/5 | 1(a) Major<br>1(b) Moderate<br>1(c) Minor | 1(a) Likely<br>1(b) Possible<br>1(c) Rare | 1(a) High<br>1(b) Medium<br>1(c) Low | **LOW** |
| **2(a) Birds<br>2(b) Insects<br>2(c) Other pests** | 2(a) RATING = 1/5<br>2(b) RATING =3.5/5<br>2(c) RATING = 2.5/5 | 2(a) RATING = 1/5<br>2(b) RATING =3.5/5<br>2(c) RATING = 2.5/5 | 2(a) Minor<br>2(b) Moderate<br>2(c) Minor | 2(a) Likely<br>2(b) Possible<br>2(c) Rare | 2(a) Medium<br>2(b) Medium<br>2(c) Low | **LOW** |
| **3(a) Birds<br>3(b) Insects<br>3(c) Other pests** | 3(a) RATING = 1/5<br>3(b) RATING =3.5/5<br>3(c) RATING = 2.5/5 | 3(a) RATING = 1/5<br>3(b) RATING =3.5/5<br>3(c) RATING = 2.5/5 | 3(a) Major<br>3(b) Major<br>3(c) Major | 3(a) Likely<br>3(b) Possible<br>3(c) Rare | 3(a) High<br>3(b) High<br>3(c) Medium | **LOW** |
| **4(a) Birds<br>4(b) Insects<br>4(c) Other pests** | 4(a) RATING = 1/5<br>4(b) RATING =3.5/5<br>4(c) RATING = 2.5/5 | 4(a) RATING = 1/5<br>4(b) RATING =3.5/5<br>4(c) RATING = 2.5/5 | 4(a) Major<br>4(b) Moderate<br>4(c) Minor | 4(a) Likely<br>4(b) Possible<br>4(c) Rare | 4(a) High<br>4(b) Medium<br>4(c) Low | **LOW** |

## Risk Register 7.4: Animal, Bird or Insect Plague – Risk Evaluation

***Table AP***

| | Risk Evaluation | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Tolerability** | **Treatment Strategies** | **Residual Consequence** | **Residual Likelihood** | **Residual Risk** | **Further Action** |
| **1(a) Birds<br>1(b) Insects<br>1(c) Other pests** | 1(a) Intolerable<br>1(b) Tolerable<br>1(c) Acceptable | 1(a) None<br>1(b) PIRSA controls, Local Government will assist.<br>1(c) PIRSA controls, Local Government will assist. | 1(a) Major<br>1(b) Moderate<br>1(c) Minor | 1(a) Likely<br>1(b) Possible<br>1(c) Rare | 1(a) High<br>1(b) Medium<br>1(c) Low | 1(b) Insects: Council to assist PIRSA in locust, grasshopper and other insect eradication through poisoning.<br>1(c) Other pests, dependent on species, support culling programs as needed and necessary. Develop game food resources.<br>More risk assessment, analysis and scientific information is needed. Both inaction and action in terms of culling native species, has political consequences.<br>1(a) Work with the SALGA to develop a research project involving a committee and volunteers to address Corella issue. Seek Grant funding for a management plan. |
| **2(a) Birds<br>2(b) Insects<br>2(c) Other pests** | 2(a) Tolerable<br>2(b) Tolerable<br>2(c) Acceptable | 2(a) None<br>2(b) PIRSA controls, Local Government will assist.<br>2(c) PIRSA controls, Local Government will assist. | 2(a) Minor<br>2(b) Moderate<br>2(c) Minor | 2(a) Likely<br>2(b) Possible<br>2(c) Rare | 2(a) Medium<br>2(b) Medium<br>2(c) Low | 1(b) Insects: Council to assist PIRSA in locust, grasshopper and other insect eradication through poisoning.<br>1(c) Other pests, dependent on species, support culling programs as needed and necessary. Develop game food resources.<br>Both inaction and action in terms of culling native species, has political consequences.<br>1(a) Work with the SALGA to develop a research project involving a committee and volunteers to address Corella issue. Seek Grant funding for a management plan. |
| **3(a) Birds<br>3(b) Insects<br>3(c) Other pests** | 3(a) Intolerable<br>3(b) Intolerable<br>3(c) Tolerable | 3(a) None<br>3(b) PIRSA controls, Local Government will assist.<br>3(c) PIRSA controls, Local Government will assist. | 3(a) Major<br>3(b) Major<br>3(c) Major | 3(a) Likely<br>3(b) Possible<br>3(c) Rare | 3(a) High<br>3(b) High<br>3(c) Medium | 1(b) Insects: Council to assist PIRSA in locust, grasshopper and other insect eradication through poisoning.<br>1(c) Other pests, dependent on species, support culling programs as needed and necessary. Develop game food resources.<br>Both inaction and action in terms of culling native species, has political consequences.<br>1(a) Work with the SALGA to develop a research project involving a committee and volunteers to address Corella issue. Seek Grant funding for a management plan. |
| **4(a) Birds<br>4(b) Insects<br>4(c) Other pests** | 4(a) Intolerable<br>4(b) Tolerable<br>4(c) Acceptable | 4(a) None<br>4(b) PIRSA controls, Local Government will assist.<br>4(c) PIRSA controls, Local Government will assist. | 4(a) Major<br>4(b) Moderate<br>4(c) Minor | 4(a) Likely<br>4(b) Possible<br>4(c) Rare | 4(a) High<br>4(b) Medium<br>4(c) Low | 1(b) Insects: Council to assist PIRSA in locust, grasshopper and other insect eradication through poisoning.<br>1(c) Other pests, dependent on species, support culling programs as needed and necessary. Develop game food resources<br>Both inaction and action in terms of culling native species, has political consequences.<br>1 (a) Work with the SALGA to develop a research project involving a committee and volunteers to manage Corella issue. Seek Grant funding for a management plan. |

## Risk Register 7.5: Animal, Bird or Insect Plague – Risk Matrix

***Table AQ***

| EVALUATIVE Matrix from NERAG<br><br>**Low Confidence Level** | | **Consequence Level** | | | | |
|---|---|---|---|---|---|---|
| | | Insignificant | Minor | Moderate | Major | Catastrophic |
| **Likelihood Level** | Almost Certain | | | | | |
| | Likely | | Untreated and treated residual risk 2(a) | | Untreated and treated residual risks 1(a), 3(a) & 4(a) | |
| | Possible | | | Untreated and treated residual risks 1(b) & 2(b), | Untreated and treated residual risks 3(b) & 4(b) | |
| | Unlikely | | | | | |
| | Rare | | Untreated and treated residual risks 1(c) & 2(c), | | Untreated and treated residual risk 3(c) | |
| | Very Rare | | Untreated and treated residual risk 4(c) | | | |
| | Almost Incredible | | | | | |

| **KEY** | |
|---|---|
| | Intolerable, High Risk |
| | Tolerable subject to ALARP, Medium Risk |
| | Broadly acceptable, Low Risk |

# Emergency Event Risk Register Part 8
# DROUGHT

**Risk Register 8.1: Drought - Context of Risk Study**
***Table AR***

| | | | |
|---|---|---|---|
| | **DATE: MAY 2014** | | |
| **OBJECTIVE:** | Conduct an assessment of the risks to the Council community from drought and consequential water deprivation. | | |
| **SCOPE:** | The assessment will address the risks from drought and water deprivation, associated with climate change, decreased rainfall, and increased salinity and lowering of the underground water table, to the local community and consider possible impacts to people and infrastructure in the Council area. Drought events to be considered are 1:20 year to 1:500 year events. | | |
| **STAKEHOLDERS** | Council and community, Tourists | | |
| **RISK CRITERIA** | NERAG consequence/likelihood tables, risk and evaluation tables | | |
| **KEY ELEMENTS** | **SOURCE** | Lack of rain, lack of water, lowering water tables, increased salinity and mineralisation | |
| | **IMPACTS** | People, Political and Public Administration, Social Setting, Infrastructure, Economy | |
| | **VULNERABLE COMMUNITIES** | Entire community threatened and is at risk as a whole | |
| **JUSTIFICATION** | It was resolved to include drought, and the justification for the inclusion of the natural phenomena of drought and lack of water availability in this emergency planning document is via the evidence presented in scientific literature, in particular climate change, and also includes the archaeological and historical record. It threatens lives and property. Further it requires a coordinated and sustained response, recovery, preparation and planning. If there is no drinkable water, tourists will not visit, destroying a valuable sector of the economy. If there is no water, the towns and villages will perish, people will leave, population will decrease, services will no longer be viable, businesses will bankrupt, the towns will be left in ruins, such as those that appear all over the Shared Services area, for example Wilson, Kanyaka, Hammond, Bruce, Eurelia, Black Rock, Oodla Wirra. These ruins were not only brought about by transport technology improvements and over optimistic planning, but were the result of drought, as well as plagues and consequential bankruptcy and the ruin of the farmers and townsfolk, as the historical record clearly shows. Drought events to be considered are 1:20 to 1:100,000 year events, taking into consideration climate change, mineralisation and salinity. | | |

## Risk register 8.2: Drought - Risk identification

***Table AS***

| | Risk Identification | | | | |
|---|---|---|---|---|---|
| **Risk No.** | **Risk Statement** | **Source** | **Impact Category** | **Prevention/ Preparedness Controls** | **Recovery Response Controls** |
| 1 | There is a high potential that drought will impact the people of the community, forcing them to leave. There is a risk that drought increases violence, including suicide, sourced from resulting economic pressures. There is a potential that water aquifers may lower, and become more saline. As the climate may change, this will increase the pressure to diversify into other agricultural/horticultural products that may or may not, be as profitable as cereals. As farming work opportunities decrease and pressures for further education increase, school leavers to mid aged people, will move away from the district, seeking work and education. Further pressure to consolidate farms, for reasons of economies of scale, will likely increase. | Climate change Drought, lack of potable water. | People | Local Emergency Planning Local planning Climate change adjustment funding, state and federal | None |
| 2 | There is a high potential that drought, will ruin crops causing farmers financial stress, and impact on tourism as water becomes unavailable, causing people not to visit, decreasing tourism revenue. There is a potential that water aquifers may lower, and become more saline. As the climate may change, this will increase the pressure to diversify into other agricultural/horticultural products that may or may not, be as profitable as cereals. As farming work opportunities decrease and pressures for further education increase, school leavers to mid aged people, will move away from the district, seeking work and education. Further pressure to consolidate farms, for reasons of economies of scale, will likely increase. Drought will likely and impact on tourism, causing people not to visit. | Climate change Drought, lack of potable water. | Economy | Local Emergency Planning Local planning Climate change adjustment funding, state and federal | None |
| 3 | There is a high potential that the Local Government Public administration will be administering a town with no residents, no business, and no rates. There is a high potential that political unrest will ensue. There is a potential, that Local Government consolidation/merger pressure will increase, and staffing rationalised. | Climate change Drought, lack of potable water. | Public Administration | Local Emergency Planning Local planning Climate change adjustment funding, state and federal | None |
| 4 | There is an extremely high potential that the social setting and resilience of the community will be shattered by drought. With no people or businesses, there can be no social setting. There is a high potential that drought causes increase in violence and suicide. With limited education and work opportunities within reasonable travel times of the district, rural population depletion will continue to occur and may increase. | Climate change Drought, lack of potable water. | Social Setting | Local Emergency Planning Local planning Climate change adjustment funding, state and federal | None |
| 5 | There is a potential that climate change driven drought, will affect the tree cover of the district and some native species will face localised extinction resulting from a lack of available food and water. The environmental factors, will affect the social and economic. See the above risk statements. | Climate change Drought, lack of potable water. | Environment | Local Emergency Planning Local planning Climate change adjustment funding, state and federal | None |
| 6 | There is a high potential that with a lack of rate revenue, Council infrastructure will experience long term failure. | Climate change Drought, lack of potable water. | Infrastructure | Local Emergency Planning Local planning Climate change adjustment funding, state and federal | None |

## Risk Register 8.3: Drought - Risk Analysis

***Table AT***

| | Risk Analysis | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Level of Existing PP Controls** | **Level of Existing RR Controls** | **Consequence** | **Likelihood** | **Risk** | **Confidence Level** |
| 1 | RATING = 2.5/5 | RATING = 0/5 | Catastrophic | Likely | Extreme | **LOW** |
| 2 | RATING = 2.5/5 | RATING = 0/5 | Catastrophic | Likely | Extreme | **LOW** |
| 3 | RATING = 2.5/5 | RATING = 0/5 | Catastrophic | Likely | Extreme | **LOW** |
| 4 | RATING = 2.5/5 | RATING = 0/5 | Catastrophic | Likely | Extreme | **LOW** |
| 5 | RATING = 2.5/5 | RATING = 0/5 | Catastrophic | Likely | Extreme | **LOW** |
| 6 | RATING = 2.5/5 | RATING = 0/5 | Catastrophic | Likely | Extreme | **LOW** |

## Risk Register 8.4: Drought – Risk Evaluation

***Table AU***

| | Risk Evaluation | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Tolerability** | **Treatment Strategies** | **Residual Consequence** | **Residual Likelihood** | **Residual Risk** | **Further Action** |
| 1 | Intolerable | None | Catastrophic | Likely | Extreme | Further analysis, research, assessment and information required.<br>Education opportunities especially in agriculture and horticulture.<br>Desalination<br>Storm water saving<br>Sewage recycling |
| 2 | Intolerable | None | Catastrophic | Likely | Extreme | Further analysis, research, assessment and information required.<br>Education opportunities especially in agriculture and horticulture.<br>Desalination<br>Storm water saving<br>Sewage recycling |
| 3 | Intolerable | None | Catastrophic | Likely | Extreme | Further analysis, research, assessment and information required.<br>Education opportunities especially in agriculture and horticulture.<br>Desalination<br>Storm water saving<br>Sewage recycling |
| 4 | Intolerable | None | Catastrophic | Likely | Extreme | Further analysis, research, assessment and information required.<br>Education opportunities especially in agriculture and horticulture.<br>Desalination<br>Storm water saving<br>Sewage recycling |
| 5 | Intolerable | None | Catastrophic | Likely | Extreme | Further analysis, research, assessment and information required.<br>Education opportunities especially in agriculture and horticulture.<br>Desalination<br>Storm water saving<br>Sewage recycling |
| 6 | Intolerable | None | Catastrophic | Likely | Extreme | Further analysis, research, assessment and information required.<br>Education opportunities especially in agriculture and horticulture.<br>Desalination<br>Storm water saving<br>Sewage recycling |

## Risk Register 8.5: Drought – Risk Matrix

***Table AV***

| EVALUATIVE Matrix from NERAG<br>**Low Confidence Level** | | **Consequence Level** | | | | |
|---|---|---|---|---|---|---|
| | | Insignificant | Minor | Moderate | Major | Catastrophic |
| **Likelihood Level** | Almost Certain | | | | | |
| | Likely | | | | Untreated risks 1,2,3,4,5,6 and treated residual risks 1,2,3,4,5,6 | |
| | Possible | | | | | |
| | Unlikely | | | | | |
| | Rare | | | | | |
| | Very Rare | | | | | |
| | Almost Incredible | | | | | |

| KEY | | |
|---|---|---|
| | | Intolerable, High Risk |
| | | Tolerable subject to ALARP, Medium Risk |
| | | Broadly acceptable, Low Risk |

# Emergency Event Risk Register Part 9
# WAR AND TERRORISM

**Risk Register 9.1: War and Terrorism – Context of Risk Study**
***Table AW***

| | | | |
|---|---|---|---|
| | **Date: May 2014** | | |
| **Objective:** | Conduct an assessment of the risks to the Council community from war and terrorism | | |
| **Scope:** | The assessment will address the risks from war and terrorism, associated with geopolitical and social sources, foreign policy and consider possible impacts to people, economy and public administration in the Council district. War and terrorism events to be considered are 1:20 year to 1:150 year events, with and without radioactive hazard. | | |
| **Stakeholders** | Community, Council, State, Nation. | | |
| **Risk Criteria** | NERAG consequence/likelihood tables, risk and evaluation tables | | |
| **Key Elements** | **Source** | War: geopolitical factors arising from foreign policy within an ecological and economic context.<br>Terrorism: social and geopolitical factors, within an economic and ecological context also sourced from mass and individual insanity as well as political, ideological & religious extremism. | |
| | **Impacts** | People, Public Administration, Economy, Social Setting, Infrastructure | |
| | **Vulnerable Communities** | Entire community and environment is potentially threatened. | |
| **Justification** | It was resolved to include war and terrorism, based on meetings with executives of the Council. The justification for the inclusion of war and terrorism, in this emergency planning document is via evidence presented in historic literature. It threatens lives, property & infrastructure. Further it requires a coordinated and sustained response, recovery, preparation and planning. War and Terrorism events to be considered are 1:20 to 1:150 year events, taking into consideration current security threat levels. | | |

## Risk register 9.2: War and Terrorism - Risk identification
***Table AX***

| | Risk Identification | | | | |
|---|---|---|---|---|---|
| **Risk No.** | **Risk Statement** | **Sources** | **Impact Category** | **Prevention/ Preparedness Controls** | **Recovery Response Controls** |
| **1(a)**<br>**1(b)** | 1(a) There is a risk of armed conflict from foreign nations (War) against the citizens, sovereignty and interests of the Commonwealth of Australia, which could negatively affect the safety and security of the people and public administration of the Council District, without nuclear radiation hazard.<br>1(b) There is a risk of armed conflict from foreign nations (War) against the citizens, sovereignty and interests of the Commonwealth of Australia, which could negatively affect the safety and security of the people and public administration of the Council District, with nuclear radiation hazard or explosions. | Geopolitical<br>Economic<br>Ideological<br>Religious<br>Climate change resulting in shortages, shortages leading to economic imperatives | People<br>Public administration<br>Infrastructure | Commonwealth and state law. Alliances and alliance cooperation. UN.<br>Australian Defence Forces<br>DSD, ONA, ASIO, ASIS, SAPOL<br>Commonwealth, State and Zone plans and procedures | Commonwealth and state law. Alliances and alliance cooperation. UN.<br>Australian Defence Forces<br>DSD, ONA, ASIO, ASIS, SAPOL<br>NGO<br>Emergency Services<br>Commonwealth, State and Zone response and recovery actions |
| **2(a)**<br>**2(b)** | 2(a) There is a risk of Terrorism, which could negatively affect the safety and security of the people and public administration of the Council District, without nuclear radiation hazard<br>2(b) There is a risk of Terrorism, which could negatively affect the safety and security of the people and public administration of the Council District, with nuclear radiation hazard or explosions | Ideological, political or religious extremism, and/or mass or individual insanity. | People<br>Public administration<br>Infrastructure | Commonwealth and state law. Alliances and alliance cooperation.<br>Australian Defence Forces<br>DSD, ONA, ASIO, ASIS<br>Federal Police<br>SAPOL<br>Commonwealth, State and Zone plans and procedures | Commonwealth and state law. Alliances and alliance cooperation.<br>Australian Defence Forces<br>DSD, ONA, ASIO, ASIS<br>Federal Police<br>SAPOL<br>Emergency Service<br>NGO<br>Commonwealth, State and Zone plans and procedures |

## Risk register 9.3: War and Terrorism - Risk analysis
***Table AY***

| | Risk Analysis | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Level of Existing PP Controls** | **Level of Existing RR Controls** | **Consequence** | **Likelihood** | **Risk** | **Confidence Level** |
| **1(a)**<br>**1(b)** | 1(a) RATING = 4.9/5 without radioactive hazards and/or explosions<br>1(b) RATING = 4/5 with radioactive hazards and/or explosions | 1(a) RATING = 4.9/5 without radioactive hazards and/or explosions<br>1(b) RATING = 4/5 with radioactive hazards and/or explosions | 1(a) Major<br><br>1(b) Catastrophic | 1(a) Unlikely<br><br>1(b) Rare | 1(a) Medium<br><br>1(b) Medium | 1(a)**LOW**<br><br>1(b)**LOW** |
| **2(a)**<br>**2(b)** | 2(a) RATING = 3.8/5 without radioactive hazards and/or explosions<br>2(b) RATING = 4.5/5 with radioactive hazards and/or explosions | 2(a) RATING = 4/5 without radioactive hazards and/or explosions<br>2(b) RATING = 2.5/5 with radioactive hazards and/or explosions | 2(a) Moderate<br><br>2(b) Catastrophic | 2(a) Possible<br><br>2(b) Very rare | 2(a) Medium<br><br>2(b) Medium | 2(a)**LOW**<br><br>2(b)**LOW** |

## Risk register 9.4: War and Terrorism – Risk evaluation
***Table AZ***

| | Risk Evaluation | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Tolerability** | **Treatment Strategies** | **Residual Consequence** | **Residual Likelihood** | **Residual Risk** | **Further Action** |
| **1** | 1(a) Tolerable<br><br>1(b) Tolerable | 1(a) & 1(b) Implement the strategies and contingencies outlined in the BCP regarding possible recruitment offices being located at LG centres. Also, maintain cordial, personable, friendly formal and informal relationships with foreign Allied governments, especially at the LG level. Cooperate and assist state and federal agencies in any way to bolster defence. | 1(a) Major<br><br>1(b) Catastrophic | 1(a) Unlikely<br><br>1(b) Rare | 1(a) Medium<br><br>1(b) Medium | No further action. Implement treatment strategies |
| **2** | 2(a) Tolerable<br><br>2(b) Tolerable | 2(a) & 2(b) As above. Cooperate with SAPOL at all times and at all levels, with regard to community safety. Report suspicious behaviour immediately. | 2(a) Moderate<br><br>2(b) Catastrophic | 2(a) Possible<br><br>2(b) Very rare | 2(a) Medium<br><br>2(b) Medium | No further action. Implement treatment strategies |

## Risk register 9.5: War and Terrorism – Risk Matrix
***Table BA***

| EVALUATIVE Matrix from NERAG<br><br>**Low Confidence Level** | | Consequence Level | | | | |
|---|---|---|---|---|---|---|
| | | **Insignificant** | **Minor** | **Moderate** | **Major** | **Catastrophic** |
| **Likelihood Level** | **Almost Certain** | | | | | |
| | **Likely** | | | | | |
| | **Possible** | | | Untreated risk 2(a), treated residual risk 2(a) | | |
| | **Unlikely** | | | | Untreated risk, 1(a), treated residual risk 1(a) | |
| | **Rare** | | | | | Untreated risk 1(b) treated residual risk 1(b) |
| | **Very Rare** | | | | | Untreated risk 2(b), treated residual risk 2(b) |
| | **Almost Incredible** | | | | | |

| KEY | |
|---|---|
| | Intolerable, High Risk |
| | Tolerable subject to ALARP, Medium Risk |
| | Broadly acceptable, Low Risk |

# Emergency Event Risk Register Part 10:
# DISEASE, HUMAN, ANIMAL OR PLANT

**Risk register 10.1: Disease; Human, Animal or Plant - Context of risk study**
***Table BB***

| | | | |
|---|---|---|---|
| | **Date: May 2014** | | |
| **Objective:** | Conduct an assessment of the risks to the Council community from disease, affecting humans, animals or plants. | | |
| **Scope:** | The assessment will address the risks from disease affecting humans, animals or plants arising from environmental sources including bacterial or viral pathogens, an consider possible impacts to people, economy, environment and public administration in the Council district. Disease events to be considered are 1:20 year to 1:500 year events. | | |
| **Stakeholders** | Community, Council, Farmers and those that rely on agriculture, tourism. State agencies DENR and PIRSA. | | |
| **Risk Criteria** | NERAG consequence/likelihood tables, risk and evaluation tables | | |
| **Key Elements** | **Source** | Pathogens in the environment, including bacteria, fungi & viruses, perhaps arising from ecological imbalance, driven by evolutionary processes. | |
| | **Impacts** | People, Public Administration, Environment, Economy, Social setting | |
| | **Vulnerable Communities** | Entire community, agriculture and environment are potentially threatened. | |
| **Justification** | It was resolved to include human, animal and plant disease, based on meetings with executives of the Council. The justification for the inclusion of disease, in this emergency planning document is via evidence presented in historic literature, as well as strong indication of threat in scientific literature. Disease threatens lives, property and the environment. Further it requires a coordinated and sustained response, recovery, preparation and planning. Disease events to be considered are 1:20 to 1:500 year events, taking into consideration current security threat levels and climate change. | | |

## Risk register 10.2: Disease; Human, Animal or Plant - Risk identification
*Table BC*

| | Risk Identification | | | | |
|---|---|---|---|---|---|
| **Risk No.** | **Risk Statement** | **Sources** | **Impact Category** | **Prevention/ Preparedness Controls** | **Recovery Response Controls** |
| **1 Human disease** | There is a risk, that disease affecting humans, could:<br>(a) Cause fatalities<br>(b) Make people sick, lowering productivity, increasing medical services load<br>(c) Be infectious<br>(d) Decrease economic productivity | Environment pathogens including fungi, viruses and bacteria perhaps resulting from ecological imbalance, driven by evolutionary processes and climate change affecting the ecology | People<br>Public administration<br>Environment<br>Economy<br>Social Setting | SA Health<br>Council Business Continuity<br>SAAS<br>Health planning<br>CSIRO<br>Families and Community SA<br>Planning and mitigation of the above agencies<br>ZEMC | SA Health<br>SAAS<br>Health planning<br>CSIRO<br>Families and Community SA<br>ZEC |
| **2 Animal disease** | There is a risk, that disease affecting animals, could:<br>(a) Cause fatalities, human distress and economic loss among valuable domestic animals, such as sheep, pigs, alpaca and cattle.<br>(b) Cause fatalities among companion animals such as cats and dogs, causing human distress and economic loss.<br>(c) Disease may transfer to humans.<br>(d) Cause fatalities to valuable rare native animals such as the Yellow footed Rock Wallaby, causing human distress, environmental damage and economic loss via tourism. | Environment pathogens including fungi, viruses and bacteria perhaps resulting from ecological imbalance, driven by evolutionary processes and climate change affecting the ecology | People<br>Public administration<br>Environment<br>Economy<br>Social Setting | PIRSA<br>SA Health<br>RSPCA<br>Council Business Continuity<br>DENR<br>CSIRO<br>Planning and mitigation of the above agencies<br>ZEMC | PIRSA<br>SA Health<br>RSPCA<br>DENR<br>CSIRO<br>ZEC |
| **3 Plant disease** | There is a risk, that disease affecting plants, could:<br>(a) Cause crop loss, human distress and economic loss among valuable agricultural and horticultural plants, such as wheat, oats, grapes and fruit trees<br>(b) Cause mass forestry loss to valuable native plants such as Eucalyptus, or River Red gum, or rarer species such as orchids, causing species loss, environmental damage, human distress and economic loss via tourism.<br>(c) Massive tree cover loss, will result in overall drier conditions, and may have unforeseen consequences. | Environment pathogens including fungi, viruses and bacteria perhaps resulting from ecological imbalance, driven by evolutionary processes and climate change affecting the ecology | People<br>Public administration<br>Environment<br>Economy<br>Social Setting | PIRSA<br>DENR<br>Council Business Continuity<br>CSIRO<br>Planning and mitigation of the above agencies<br>ZEMC | PIRSA<br>DENR<br>CSIRO<br>ZEC |

## Risk register 10.3: Disease; Human, Animal or Plan- Risk analysis
*Table BD*

| | Risk Analysis | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Level of Existing PP Controls** | **Level of Existing RR Controls** | **Consequence** | **Likelihood** | **Risk** | **Confidence Level** |
| **1 Human** | RATING = 3.5/5 | RATING = 4/5 | Moderate | Possible | Medium | **LOW** |
| **2 Animal** | RATING = 3.5/5 | RATING = 4/5 | Moderate | Possible | Medium | **LOW** |
| **3 Plant** | RATING =3.5/5 | RATING = 4/5 | Moderate | Possible | Medium | **LOW** |

## Risk register 10.4: Disease; Human, Animal or Plant– Risk Evaluation
*Table BE*

| | Risk Evaluation | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Tolerability** | **Treatment Strategies** | **Residual Consequence** | **Residual Likelihood** | **Residual Risk** | **Further Action** |
| **1 Human** | Tolerable | Participate in ZEMC SA Health programs | Moderate | Possible | Medium | Implement treatment strategies. Further research required |
| **2 Animal** | Tolerable | Participate in ZEMC PIRSA & DENR programs | Moderate | Possible | Medium | Implement treatment strategies. Further research required |
| **3 Plant** | Tolerable | Participate in ZEMC PIRSA & DENR programs | Moderate | Possible | Medium | Implement treatment strategies. Further research required |

## Risk register 10.5: Disease; Human, Animal or Plant – Risk Matrix

***Table BF***

| EVALUATIVE Matrix from NERAG<br><br>**Low Confidence Level** | | **Consequence Level** | | | | |
|---|---|---|---|---|---|---|
| | | **Insignificant** | **Minor** | **Moderate** | **Major** | **Catastrophic** |
| **Likelihood Level** | **Almost Certain** | | | | | |
| | **Likely** | | | | | |
| | **Possible** | | | Untreated risks, 1, 2, 3 and treated residual risks, 1, 2 & 3 | | |
| | **Unlikely** | | | | | |
| | **Rare** | | | | | |
| | **Very Rare** | | | | | |
| | **Almost Incredible** | | | | | |

| KEY | |
|---|---|
| | Intolerable, High Risk |
| | Tolerable subject to ALARP, Medium Risk |
| | Broadly acceptable, Low Risk |

# Emergency Event Risk Register Part 11:
# ASTRONOMICAL PHENOMENA AND SPACE WEATHER

**Risk Register 11.1: Astronomical Phenomena and Space Weather- Context of risk study**
***Table BG***

| | | |
|---|---|---|
| | **Date: May 2014** | |
| **Objective:** | Conduct an assessment of the risks to the Council community from astronomical phenomena and space weather. | |
| **Scope:** | The assessment will address the risks from astronomical phenomena and space weather arising from material orbiting the Earth, the environs of the Solar System and known hazards within the Milky Way Galaxy. The assessment will consider possible impacts to people, and the environment in the Council district. Disease events to be considered are 1:20 year to 1:1000 year events. | |
| **Stakeholders** | Community, Council, all citizens, Bureau of Meteorology, CSIRO, NASA. | |
| **Risk Criteria** | NERAG consequence/likelihood tables, risk and evaluation tables | |
| **Key Elements** | **Source** | Earth orbiting material, "space junk". Solar weather events such as sun flares and electromagnetic pulses. Solar system events such as Earth affecting meteorites derived from the Asteroid belt. Galactic events such as super nova and black holes. |
| | **Impacts** | Life on the planet |
| | **Vulnerable Communities** | Everything, everyone. |
| **Justification** | It was resolved to include astronomical phenomena based on meetings with executives of the Council. The justification for the inclusion of astronomical, in this emergency planning document is via evidence presented in scientific literature. Astronomical events have the potential to threaten all life on earth, space weather such as solar flares, have affected power transmission and other devices dependent on electromagnetic radio transmission. Further it would require a coordinated and sustained response, recovery, preparation and planning. Astronomical events and space weather to be considered are 1:20 to 1:1000 year events. | |

## Risk register 11.2: Astronomical Phenomena and Space Weather - Risk identification\

***Table BH***

| | Risk Identification | | | | |
|---|---|---|---|---|---|
| **Risk No.** | **Risk Statement** | **Sources** | **Impact Categories** | **Prevention/ Preparedness Controls** | **Recovery Response Controls** |
| **1 space junk** | There is a risk that material, derived from satellites and other space craft, could descend from orbit and strike the community. | "Space junk" orbiting the earth, space exploration and communications satellites | People | Australian Defence Force<br>Allied defence forces<br>NASA<br>CSIRO | Australian Defence Force<br>Allied defence forces<br>NASA<br>CSIRO |
| **2 (a) & (b) solar weather** | There is a risk that solar weather could affect the community in the following ways:<br>(a) Solar flares<br>(b) Electromagnetic pulse | Sun | People<br>Infrastructure<br>Economy | CSIRO<br>BOM<br>NASA<br>Allied worldwide Scientific Community<br>Corporate and Council business continuity planning<br>ETSA | ETSA<br>Australian Defence Forces<br>All Emergency Agencies |
| **3 (a) & (b) solar system events, meteorites** | (a) There is a risk that solar system events including meteorites may strike the Earth causing widespread damage to all of Earth life.<br>(b) There is a risk that a meteorite may strike near the community, causing localised damage | Solar orbiting materiel that may impact upon the Earth | People<br>Infrastructure<br>Economy<br>Environment | CSIRO<br>BOM<br>NASA<br>Allied worldwide Scientific Community<br>Corporate and Council business continuity planning | Australian Defence Forces<br>Allied defence forces<br>All Emergency Agencies |
| **4 galactic events** | There is a risk that galactic, or near galactic events of the Milky Way could affect life on Earth and includes phenomena such as super nova and black holes, as well as radiation transmission. | Collapsing/dying stars, cosmic events | Everything | CSIRO<br>BOM<br>NASA<br>Allied worldwide Scientific Community | None |

## Risk register 11.3: Astronomical Phenomena and Space Weather - Risk analysis

***Table BI***

| | Risk Analysis | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Level of Existing PP Controls** | **Level of Existing RR Controls** | **Consequence** | **Likelihood** | **Risk** | **Confidence Level** |
| **1** | RATING = 4.5/5 | RATING = 4.7/5 | Insignificant | Very rare | Low | **Low** |
| **2(a)**<br>**2(b)** | 2(a) RATING = 3/5<br>2(b) RATING = 3/5 | 2(a) RATING = 3/5<br>2(b) RATING = 3/5 | 2(a) Minor<br>2(b) Major | 2(a) Possible<br>2(b) Rare | 2(a) Moderate<br>2(b) Moderate | **Low** |
| **3(a)**<br>**3(b)** | 3(a) RATING = 4.5/5<br>3(b) RATING = 4.5/5 | 3(a) RATING = 1/5<br>3(b) RATING = 4/5 | 3(a) Catastrophic<br>3(b) Minor | 3(a) Almost incredible<br>3(b) Almost incredible | 3(a) Moderate<br>3(b) Low | **Low** |
| **4** | RATING = 2/5 | RATING = 0/5 | Catastrophic | Almost Incredible | Moderate | **Low** |

## Risk register 11.4: Astronomical Phenomena and Space Weather – Risk evaluation

***Table BJ***

| | Risk Evaluation | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Tolerability** | **Treatment Strategies** | **Residual Consequence** | **Residual Likelihood** | **Residual Risk** | **Further Action** |
| **1** | Acceptable | None | Insignificant | Very rare | Low | More CSIRO research. |
| **2(a)**<br>**2(b)** | 2(a) Tolerable<br>2(b) Tolerable | 2(a) Business Continuity Planning<br>2(b) Business Continuity Planning | 2(a) Minor<br>2(b) Major | 2(a) Possible<br>2(b) Rare | 2(a) Moderate<br>2(b) Moderate | More CSIRO research. |
| **3(a)**<br>**3(b)** | 3(a) Tolerable<br>3(b) Acceptable | 3(a) None<br>3(b) Business Continuity Planning | 3(a) Catastrophic<br>3(b) Minor | 3(a) Almost incredible<br>3(b) Almost incredible | 3(a) Moderate<br>3(b) Low | More CSIRO research. |
| **4** | Tolerable | None | Catastrophic | Almost Incredible | Moderate | More CSIRO research. |

## Risk Register 11.5 Astronomical phenomena and space weather – Risk Matrix
***Table BK***

| EVALUATIVE Matrix from NERAG<br><br>**Low Confidence Level** | | **Consequence Level** | | | | |
|---|---|---|---|---|---|---|
| | | **Insignificant** | **Minor** | **Moderate** | **Major** | **Catastrophic** |
| **Likelihood Level** | **Almost Certain** | | | | | |
| | **Likely** | | | | | |
| | **Possible** | | Untreated risk 2(a) and treated residual risk 2(a) | | | |
| | **Unlikely** | | | | | |
| | **Rare** | | | | Untreated risk 2(b) and treated residual risk 2(b) | |
| | **Very Rare** | | | | | |
| | **Almost Incredible** | Untreated risk 1 & treated residual risk 1 | Untreated risk 3(b) and treated residual risk 3(b) | | | Untreated risk 4, 3(a) & treated residual risk 4, 3(a) |

| KEY | |
|---|---|
| | Intolerable, High Risk |
| | Tolerable subject to ALARP, Medium Risk |
| | Broadly acceptable, Low Risk |

# Emergency Event Risk Register Part 12:
# INDUSTRIAL ACCIDENTS WITH OR WITHOUT RADIATION HAZARD

**Risk register 12.1: Industrial accidents with or without radiation hazard - Context of risk study**
***Table BL***

| | | | |
|---|---|---|---|
| | **Date: May 2014** | | |
| **Objective:** | Conduct an assessment of the risks to the Council community from industrial accidents, with or without a radiation hazard present. | | |
| **Scope:** | The assessment will address the risks from Industrial accidents including grain silos and fuel stores but also mines/minerals processing, with or without a radiation hazard arising from Industrial and mining activity within or within proximity of the Council district. The assessment will consider possible impacts to people, and the environment in the Council district. Disease events to be considered are 1:20 year to 1:200 year events. | | |
| **Stakeholders** | Community, Council, all citizens, all industries, farmers, miners, BHP Billiton, all emergency service agencies. Barite processing factory. | | |
| **Risk Criteria** | NERAG consequence/likelihood tables, risk and evaluation tables | | |
| **Key Elements** | **Source** | Machine or human failure, resulting in explosion, fire, HAZMAT, toxic chemicals or radiation | |
| | **Impacts** | People, Infrastructure, Environment | |
| | **Vulnerable Communities** | Farms, all citizens, fuel stores, grain silos, Barite processing | |
| **Justification** | It was resolved to include industrial accidents based on meetings with executives of the Council. The justification for the inclusion of industrial accidents including those that may involve fuel stores, grain silos and minerals processing, in this emergency planning document is via evidence presented in worldwide historic and scientific literature, and SA workers compensation courts. Industrial accidents events have the potential to threaten people, infrastructure and the environment in the Council Area. Further it would require a coordinated, multi-agency with HAZMAT capability and sustained response, recovery, preparation and planning. Industrial accidents to be considered are 1:5 to 1:100 year events. | | |

## Risk register 12.2: Industrial accidents with or without radiation hazard - Risk identification
*Table BM*

| | Risk Identification | | | | |
|---|---|---|---|---|---|
| **Risk No.** | **Risk Statement** | **Sources** | **Impact Categories** | **Prevention/ Preparedness Controls** | **Recovery Response Controls** |
| **1(a)**<br>**1(b)** | 1(a) There is a risk that a nearby mine or minerals processing plant could explode, emit toxic chemicals or otherwise endanger the Council area.<br>1(b) As above, with radiation as another hazard applied | 1(a) Minerals processing, hazardous chemicals<br>1(b) Radioactive material such as uranium | People<br>Infrastructure<br>Environment | CFS<br>State and federal legislation and regulation<br>Mining or mineral processing company safety application procedure and planning, & engineering<br>ZEMC and ZEC plans and procedures<br>Council land use planning | Business Continuity Plans<br>All Emergency Service Agencies<br>All functional service agencies<br>State and Federal Plans<br>ZEC and ZEMC plans and procedures<br>Company response and recovery |
| **2** | There is a risk that a grain silo in town could explode or catch fire | Wheat powder dust in silos has explosive potential | People<br>Infrastructure<br>Environment | CFS<br>State and federal legislation and regulation<br>Grain store safety application, procedure and planning, & engineering<br>ZEMC and ZEC plans and procedures<br>Council land use planning | Business Continuity Plans<br>All Emergency Service Agencies<br>All functional service agencies<br>State and Federal Plans<br>ZEC and ZEMC plans and procedures<br>Company response and recovery |
| **3** | There is a risk that a fuel store could explode or catch fire or otherwise endanger the Council area. | Petroleum products and other chemicals | People<br>Infrastructure<br>Environment | CFS<br>State and federal legislation and regulation<br>Fuel store company safety application, procedure and planning, & engineering<br>ZEMC and ZEC plans and procedures<br>Council land use planning | Business Continuity Plans<br>All Emergency Service Agencies<br>All functional service agencies<br>State and Federal Plans<br>ZEC and ZEMC plans and procedures<br>Company response and recovery |
| **4** | There is a risk that light industry or farming in the Council area, could explode or catch fire, or otherwise endanger the Council area. | Petroleum products, oxygen acetylene welding equipment, other hazardous chemicals | People<br>Infrastructure<br>Environment | CFS<br>State and federal legislation and regulation<br>Light industry or Farming safety application, procedure and planning, & engineering<br>ZEMC and ZEC plans and procedures<br>Council land use planning | Business Continuity Plans<br>All Emergency Service Agencies<br>All functional service agencies<br>State and Federal Plans<br>ZEC and ZEMC plans and procedures<br>Company response and recovery |

## Risk Register 12.3: Industrial accidents with or without radiation hazard - Risk analysis
*Table BN*

| | Risk Analysis | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Level of Existing PP Controls** | **Level of Existing RR Controls** | **Consequence** | **Likelihood** | **Risk** | **Confidence Level** |
| **1(a)**<br>**1(b)** | 1(a) RATING = 4/5<br>1(b) RATING =4.5/5 | 1(a) RATING = 3.5/5<br>1(b) RATING = 2/5 | 1(a) Moderate<br>1(b) Catastrophic | 1(a) Very Rare<br>1(b) Almost incredible | 1(a) Medium<br>1(b) Medium | **Low** |
| **2** | RATING = 4/5 | RATING = 3.5/5 | Moderate | Rare | Medium | **Low** |
| **3** | RATING = 4.7/5 | RATING = 3.5/5 | Major | Very Rare | Medium | **Low** |
| **4** | RATING = 2.5/5 | RATING = 3.5/5 | Moderate | Very Rare | Medium | **Low** |

## Risk register 12.4: Industrial accidents with or without radiation hazard – Risk evaluation
*Table BO*

| | Risk Evaluation | | | | | |
|---|---|---|---|---|---|---|
| **Risk No.** | **Tolerability** | **Treatment Strategies** | **Residual Consequence** | **Residual Likelihood** | **Residual Risk** | **Further Action** |
| **1(a)**<br>**1(b)** | 1(a) Tolerable<br>1(b) Tolerable | 1(a) Participate in ZEMC planning, but none that Council can apply directly.<br>1(b) Insist on baseline radiation testing | 1(a) Moderate<br>1(b) Catastrophic | 1(a) Very Rare<br>1(b) Almost incredible | 1(a) Medium<br>1(b) Medium | Raise risks at ZEMC meetings<br>Insist on baseline radiation testing |
| **2** | Tolerable | Participate in ZEMC planning, but none that Council can apply directly. | Moderate | Rare | Medium | Raise risks at ZEMC meetings<br>Insist on baseline radiation testing |
| **3** | Tolerable | Participate in ZEMC planning, but none that Council can apply directly. | Major | Very Rare | Medium | Raise risks at ZEMC meetings<br>Insist on baseline radiation testing |
| **4** | Tolerable | Participate in ZEMC planning, but none that Council can apply directly. | Moderate | Very Rare | Medium | Raise risks at ZEMC meetings<br>Insist on baseline radiation testing |

Risk register 12.5: Industrial accidents with or without radiation hazard - Risk Matrix
***Table BP***

| EVALUATIVE Matrix from NERAG<br>**Low Confidence Level** | | **Consequence Level** | | | | |
|---|---|---|---|---|---|---|
| | | **Insignificant** | **Minor** | **Moderate** | **Major** | **Catastrophic** |
| **Likelihood Level** | **Almost Certain** | | | | | |
| | **Likely** | | | | | |
| | **Possible** | | | | | |
| | **Unlikely** | | | | | |
| | **Rare** | | | Untreated and treated residual risk 2 | | |
| | **Very Rare** | | | Untreated and treated residual risks 1(a), & 4 | Untreated and treated residual risk 3 | |
| | **Almost Incredible** | | | | | Untreated and treated residual risk 1(b) |

| KEY | |
|---|---|
| | Intolerable, High Risk |
| | Tolerable subject to ALARP, Medium Risk |
| | Broadly acceptable, Low Risk |

# ANNEXURE A: GLOSSARY

To meet the requirements of Section 8(d) of the Local Government Act it is recommended that the following hierarchy of definitions is used in order to avoid confusion and to promote consistency:

- Emergency Management Act 2004
- State Emergency Management Plan (SEMP), formed under Sect. 9 of the State Emergency Management Act 2004.
- EMA or National plans and policies
- Local plans and policies

***Table BQ***

| Term | Definition of Term. |
|---|---|
| **Australian Inter Service Incident Management System (AIIMS)** | Five sub-systems which collectively provide a total systems approach to incident management, modified from the National Interagency Incident Management System (USA). (EMA, 1998) |
| **Command** | The direction of personnel and resources of an organisation in the performance of that organisation's role and tasks. Command relates to organisations and operates vertically within an organisation. Direction of members and resources of an organisation in performance of its agreed roles and tasks. Authority to command is established in legislation or by agreement within an organisation. Command relates to an organisation and operates vertically within it. (EMA, 2009) |
| **Community** | A group of people with a commonality of association and generally defined by location, shared experience or function (EMA, 2009). |
| **Control** | Overall direction of emergency management activities in a designated emergency situation. Authority for control is established in legislation or in an emergency plan, and carries with it responsibility for tasking and coordinating other organisations in accordance with the needs of the situation. Control relates to situations and operates horizontally across organisations. (EMA, 2009) |
| **Control Agency** | The agency assigned the function in the SEMP of exercising control of persons and agencies involved in response operations relating to an emergency. The SA Emergency Management Act 2004 Section 20 as below states:<br>*(1) Subject to subsection (2), the control agency in relation to an emergency will be determined as follows:*<br>*(a) if, under an Act or law or the State Emergency Management Plan, a particular person or agency is assigned the function of exercising control of persons and agencies involved in response operations relating to such an emergency then that person or agency is the control agency for that emergency……*<br>*(2) Despite any other Act or law, where the senior police officer involved in response operations in relation to an emergency forms a reasonable suspicion that the emergency has resulted from, or is related to, a terrorist act, South Australia Police will be the control agency in relation to the emergency.*<br><br>EMA defines Control Agency as: "… Agencies nominated to control the response activities to a specified type of emergency." (EMA, 2009) |
| **Coordination** | The SA Emergency Management Act 2004 states at section 19 – Coordinating Agency:<br>(1*) Subject to subsection (2), South Australia Police will be the co-ordinating agency for all emergencies.*<br>*(2) The State Emergency Management Plan may designate a different body or organisation as the co-ordinating agency in relation to an emergency of a specified kind.*<br><br>Coordination as defined by EMA is: "*The bringing together of emergency services and other resources to ensure an effective emergency management response. It is primarily concerned with the systematic acquisition and application of resources in accordance with the requirements arising from a hazard or the impact of an emergency. Coordination relates primarily to resources: it operates vertically within an organisation as a function of the authority to command; and horizontally across organisations as a function of the authority to control"* (EMA, 2009) |

| Term | Definition of Term. |
|---|---|
| **Council** | For the purposes of this CERM plan, Council refers to the Flinders Ranges Council, a Local Government Entity under the Local Government Act 1999. |
| **Critical Infrastructure** | Critical infrastructure includes those services, physical facilities, supply chains, information technologies and communication networks that, if destroyed, degraded or rendered unavailable for an extended period, would significantly impact on the social or economic well-being of the community. These infrastructures include:<br>• telecommunications;<br>• electrical power systems;<br>• gas and oil storage and transportation;<br>• banking and finance;<br>• transportation; and<br>• water supply systems and sewerage<br>Adapted from Critical Infrastructure Advisory Council (CIAC). (TISN Trusted information sharing network, 2012). |
| **Consequence** | The outcome of an event expressed qualitatively or quantitatively, being a loss, injury, disadvantage or gain. There may be a range of possible outcomes associated with an event. (In emergency risk management - the outcome of an event or situation expressed qualitatively or quantitatively. In the emergency risk management context consequences are generally described as the effects on people, property, essential services, the environment and the economy. |
| **Disaster** | A catastrophic event that severely disrupts the fabric of a community which is beyond the day-to-day capacity of emergency services and other organisations and requires the intervention of the various levels of government to return the community to normality. (Local Government of South Australia, 2001, p. 4) |
| **Elements at Risk** | The population, buildings and civil engineering works, economic activities, public services and infrastructure etc. exposed to sources of risk. (EMA, p. 48) |
| **Emergency** | The SA Emergency Management Act 2004 interprets:<br>*"emergency means an event (whether occurring in the State, outside the State or in and outside the State) that causes, or threatens to cause—*<br>*(a) the death of, or injury or other damage to the health of, any person; or*<br>*(b) the destruction of, or damage to, any property; or*<br>*(c) a disruption to essential services or to services usually enjoyed by the community; or*<br>*(d) harm to the environment, or to flora or fauna;*<br>*Note—This is not limited to naturally occurring events (such as earthquakes, floods or storms) but would, for example, include fires, explosions, accidents, epidemics, pandemics, emissions of poisons, radiation or other hazardous agents, hijacks, sieges, riots, acts of terrorism and hostilities directed by an enemy against Australia "*<br>EMA defines Emergency as *"Events, actual, or imminent, which endanger or threatens to endanger life, property or the environment, and which require a significant and coordinated response".* (EMA, 2009) |
| **Emergency Risk Management** | A systematic process that produces a range of measures that contributes to the wellbeing of communities and the environment. (EMA, p. 48) |
| **Environment** | The complex of physical, chemical and biological agents and social factors which may impact on a person or a community. (EMA, 1998)<br>Conditions or influences comprising social, physical and built elements which surround and interact with the community. (EMA, p. 48) |
| **Event** | Occurrence of a particular set of circumstances. (EMA, p. 48) |
| **Likelihood** | In community emergency risk management describes the probability or frequency of harmful consequences occurring. (EMA, p. 53) |
| **Hazard** | • A source of potential harm or a situation with a potential to cause loss.<br>• A potential or existing condition that may cause harm to people or damage to property or the environment.<br>• An intrinsic capacity associated with an agent or process capable of causing harm<br>(EMA , 1998) |

| Term | Definition of Term. |
|---|---|
| **Incident** | An emergency event or series of events which requires a response from one or more of the statutory response agencies. (EMA, 2009) |
| **Mitigation** | Measures taken in advance of, or after, a disaster aimed at decreasing or eliminating its impact on society and environment. (State Emergency Management Committee, p. 48) |
| **Recovery** | In SA: *Recovery operations means any measures taken during or after an emergency to assist the re-establishment of the normal pattern of life of individuals, families and communities affected by the emergency and includes—*<br>• *the restoration of essential facilities and services; and*<br>• *the restoration of other facilities and services necessary for the normal functioning of a community; and*<br>• *the provision of material and personal needs; and*<br>• *the provision of means of emotional support*; (Emergency Management Act 2004 Section 3)<br><br>*"Recovery is the coordinated process of supporting disaster-affected communities in the reconstruction of the physical infrastructure and restoration of emotional, social, economic and physical wellbeing. This involves a broad spectrum of services including public and environmental health, hospitals and health services, social and financial services and a range of engineering or public works services. This work will commence as quickly as practicable and will focus on restoring essential services and public confidence"*. (State Emergency Management Committee, p. 137)<br><br>Recovery in the SEMP is defined as:<br>'*The conduct of human, economic and environmental measures necessary to re-establish the normal pattern of life of individuals, families and communities affected by an emergency, including:*<br>• *the restoration of essential facilities and services*<br>• *the restoration of other facilities, services and social networks necessary for the normal functioning of a community*<br>• *the provision of material and personal needs*<br>• *the provision of means of emotional support*<br>• *the recovery of the natural environment*<br>• *support to assist the recovery of business* (State Emergency Management Committee, p. 52)<br>*"The coordinated process of supporting emergency-affected communities in the reconstruction of the physical infrastructure and restoration of emotional, social, economic and physical wellbeing"* (EMA, 2004, p. 49) |
| **Relief** | The provision of immediate shelter, life support and human needs of persons affected by, or responding to, an emergency. (EMA, 2009) |
| **Residual Risk** | The risk remaining after implementation of risk treatment. (EMA, p. 49) |
| **Resilience** | A measure of how quickly a system recovers from the impact of an emergency event. (EMA , 2004, p. 49) |
| **Response** | Actions taken in anticipation of, during, and immediately after an emergency to ensure that its effects are minimised, and that people affected are given immediate relief and support. (EMA , 2009) |
| **Response Operations** | *"Response operations means any measures taken during an emergency to protect life or property or to otherwise respond to the emergency;"* SA Emergency Management Act 2004 Section 3. |
| **Risk** | The chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and likelihood.<br>(In emergency risk management – a concept used to describe the likelihood of harmful consequences arising from the interaction of hazards, communities and the environment.) (Local Government of South Australia, 2001) |
| **Risk Treatment** | The process of developing, selecting and implementing measures to modify risk (EMA, p. 49). The comprehensive approach is used by the State of SA which recognises four types of activities, prevention, preparedness, response and recovery. (State Emergency Management Committee, 2011) |

# ANNEXURE B: NERAG RISK CRITERIA

## CONSEQUENCE, LIKELIHOOD AND IMPACT TABLES WITH ALARP

***Table 2*: Consequence Table and Impact Categories** (NERAG AS/NZ ISO 31000:2009 pg 32)

| Consequence Level | IMPACT CATEGORIES | | | | | |
|---|---|---|---|---|---|---|
| | **People** | **Environment** | **Economy** | **Public Administration,** | **Social Setting** | **Infrastructure** |
| **Catastrophic** | Widespread multiple loss of life (mortality > 1 in 10,000) health system unable to cope, displacement of people beyond ability to cope | Widespread severe impairment or loss of ecosystem functions across species and landscape, irrecoverable environmental damage | Unrecoverable financial loss > 3% of government sector's revenues' asset destruction across industry sectors leading to widespread business failures and loss of employment | Governing body unable to manage the event, disordered public administration without effective functioning, public unrest, media coverage beyond region or jurisdiction | Community unable to support itself, widespread loss of objects of cultural significance, impacts beyond emotional and psychological capacity in all parts of the community | Long term failure of significant infrastructure and service delivery affecting all parts of the community, ongoing external support at large scale required. |
| **Major** | Multiple loss of life (mortality > 1 in 100,000), health system overstressed, large numbers of displaced people (more than 24 hours) | Severe impairment or loss of ecosystem functions affecting many species or landscapes, progressive environmental damage | Financial loss 1-3% of the government sector's revenues' requiring major changes in business strategy to (partly) cover loss, significant disruptions across industry sectors leading to multiple business failures and loss of employment. | Governing body absorbed with managing the event, public administration struggles to provide merely critical services, loss of public confidence in governance, media coverage beyond region or jurisdiction. | Reduced quality of life within the community, significant loss or damage to objects of cultural significance, impacts beyond emotional and psychological capacity in large parts of the community | Mid to long term failure of significant infrastructure and service delivery affecting large parts of the community, initial external support required |
| **Moderate** | Isolated cases of loss of life (mortality > than 1 in 1,000,000) Health system operating at maximum capacity, isolated cases of displacement of people (less than 24 hours) | Isolated but significant cases of impairment or loss of ecosystem functions, intensive efforts for recovery required. | Financial loss of 0.3% to 1% of the government sector's revenues requiring adjustments to business strategy to cover loss, disruptions to selected industry sectors leading to isolated cases of business failure and multiple loss of employment. | Governing body manages the event, with considerable diversion from policy, public administration functions limited by focus on critical services, widespread public protests, media coverage within region or jurisdiction. | Ongoing reduced services within community, permanent damage to objects of cultural significance, impacts beyond emotional and psychological capacity in some parts of the community. | Mid-term failure of (significant) infrastructure and service delivery affecting some parts of the community, widespread inconveniences |
| **Minor** | Isolated cases of serious injuries, health system operating within normal parameters | Isolated cases of environmental damage, one- off recovery efforts required | Financial loss of 0.1% to 0.3% of government sector revenues requiring activation of reserves to cover loss, disruptions at business level leading to isolated cases of loss of employment | Governing body manages the event under an emergency regime, public administration functions with some disturbances, isolated expressions of public concern, media coverage within t region or jurisdiction. | Isolated and temporary cases of reduced services within the community, repairable damage to objects of cultural significance, impacts within emotional and psychological capacity of the community | Isolated cases of short to mid-term failure of infrastructure and service delivery, localised inconveniences. |
| **Insignificant** | Near misses or minor injuries, no reliance on health system | Near misses or incidents without environmental damage, no recovery efforts needed. | Financial loss of < 0.1% of the government sector's revenues to be managed within standard financial provisions, inconsequential disruptions at the business level | Governing body manages the event within normal parameters, public administration functions, without disturbances, public confidence in governance, no media attention | Inconsequential short term reduction of services, no damages to objects of cultural significance, no adverse emotional and psychological impacts. | Inconsequential short term failure of infrastructure and service delivery, no disruption to the public services. |

***Table 2 (cont)*: Impact Categories Defined** (NERAG AS/NZ ISO 31000:2009 pg 33)

| Impact Category Definitions | |
|---|---|
| **People** | Relates to the direct impacts of the emergency on the physical health of people/individuals and emergency services (i.e. Health system), ability to manage.<br>Mortality defined as the ratio of deaths in an area to the population of that area; expressed per1000 per year |
| **Environment** | Relates to the impacts of the emergency and its effects on the ecosystem of the area, including flora and fauna. |
| **Economy** | Relates to the economic impact of the emergency on the governing body as reported in the annual operating statement for the relevant jurisdiction and industry sectors as defined by the Australian Bureau of Statistics |
| **Public Administration** | Relates to the impacts of the emergency on the Governing body's ability to govern. |
| **Social Setting** | Relates to the impacts of the emergency on society and its social fabric, including its cultural heritage, resilience of the community |
| **Infrastructure** | Relates to the impacts of the emergency on the area's infrastructure/lifelines/utilities, and its ability to service the community.<br><br>Long-term failure = Repairs will take longer than 6 months<br><br>Mid to long-term failure = repairs will be undertaken in 3 to 6 months<br><br>Mid-term failure = Repairs may be undertaken in 1 to 3 months<br><br>Short to mid-term failure = Repairs may be undertaken in 1 week to 1 month<br><br>Short term failure = Repairs may be undertaken in less than 1 week |

***Table 3*: Likelihood Table** (NERAG AS/NZ ISO 31000:2009 pg 33)

| Likelihood Level | Frequency | Average Recurrence Interval | Annual Exceedence Probability |
|---|---|---|---|
| **Almost Certain** | Once or more per year | < 3 years | > 0.3 |
| **Likely** | Once per ten years | 3 – 30 years | 0.031 – 0.3 |
| **Possible** | Once per 100 years | 31 – 300 years | 0.0031 – 0.03 |
| **Unlikely** | Once per thousand years | 301 – 3,000 years | 0.00031 – 0.003 |
| **Rare** | Once per ten thousand years | 3,001 – 30,000 years | 0.000031 – 0.0003 |
| **Very Rare** | Once per hundred thousand years | 30,001 – 300,000 years | 0.0000031 – 0.00003 |
| **Almost Incredible** | Less than once per one million years | > 300,000 years | < 0.0000031 |

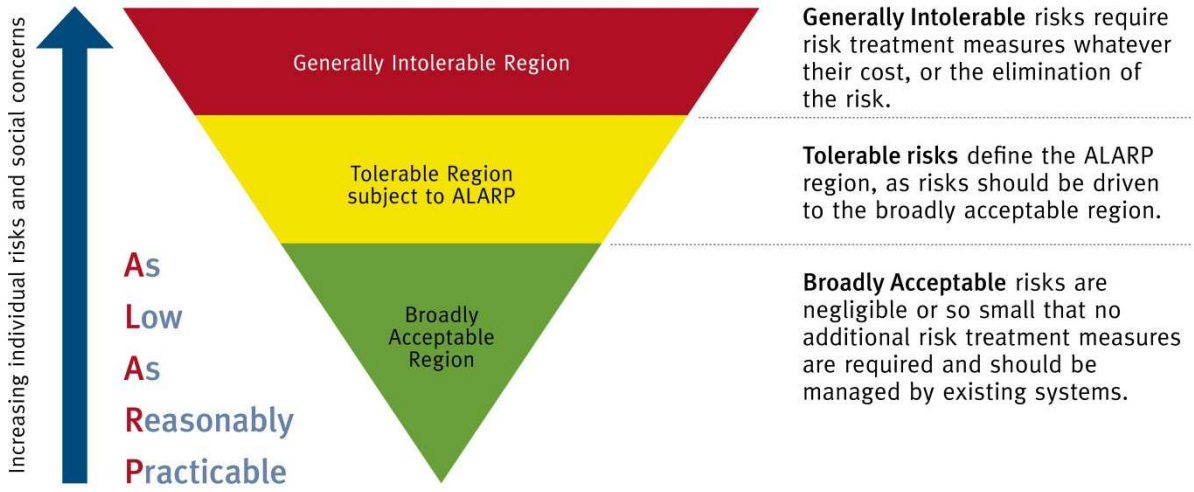



***Figure 9*: ALARP – As Low As Reasonably Practical Principle**
**(NERAG AS/NZ ISO 31000:2009 PG 39)**

# ANNEXURE C: RISK MATRICES AND CONFIDENCE LEVELS

***Table 4*: Qualitative Risk Matrix**

| | | CONSEQUENCE LEVEL | | | | |
|---|---|---|---|---|---|---|
| | | Insignificant | Minor | Moderate | Major | Catastrophic |
| LIKELIHOOD | Almost Certain | Medium | Medium | High | Extreme | Extreme |
| | Likely | Low | Medium | High | High | Extreme |
| | Possible | Low | Low | Medium | High | High |
| | Unlikely | Low | Low | Medium | Medium | High |
| | Rare | Low | Low | Low | Medium | Medium |
| | Very Rare | Low | Low | Low | Low | Medium |
| | Almost Incredible | Low | Low | Low | Low | Low |

(NERAG AS/NZ ISO 31000:2009 pg 35)

***Table 6*: Evaluation Table HIGH CONFIDENCE**

| | | CONSEQUENCE LEVEL | | | | |
|---|---|---|---|---|---|---|
| | | Insignificant | Minor | Moderate | Major | Catastrophic |
| LIKELIHOOD | Almost Certain | | | | | |
| | Likely | | | | | |
| | Possible | | | | | |
| | Unlikely | | | | | |
| | Rare | | | | | |
| | Very Rare | | | | | |
| | Almost Incredible | | | | | |

| KEY | |
|---|---|
| | Intolerable |
| | Tolerable subject to ALARP |
| | Broadly acceptable |

(NERAG AS/NZ ISO 31000:2009 pg 40)

***Table 7:* Evaluation Table MODERATE CONFIDENCE**

| | | CONSEQUENCE LEVEL | | | | |
|---|---|---|---|---|---|---|
| | | Insignificant | Minor | Moderate | Major | Catastrophic |
| LIKELIHOOD | Almost Certain | | | | | |
| | Likely | | | | | |
| | Possible | | | | | |
| | Unlikely | | | | | |
| | Rare | | | | | |
| | Very Rare | | | | | |
| | Almost Incredible | | | | | |

| KEY | |
|---|---|
| | Intolerable |
| | Tolerable subject to ALARP |
| | Broadly acceptable |

(NERAG AS/NZ ISO 31000:2009 pg 40)

***Table 8*: Evaluative Table LOW CONFIDENCE LEVEL**

| | | CONSEQUENCE LEVEL | | | | |
|---|---|---|---|---|---|---|
| | | Insignificant | Minor | Moderate | Major | Catastrophic |
| LIKELIHOOD | Almost Certain | | | | | |
| | Likely | | | | | |
| | Possible | | | | | |
| | Unlikely | | | | | |
| | Rare | | | | | |
| | Very Rare | | | | | |
| | Almost Incredible | | | | | |

| KEY | | |
|---|---|---|
| | | Intolerable |
| | | Tolerable subject to ALARP |
| | | Broadly acceptable |

(NERAG AS/NZ ISO 31000:2009 pg 40)

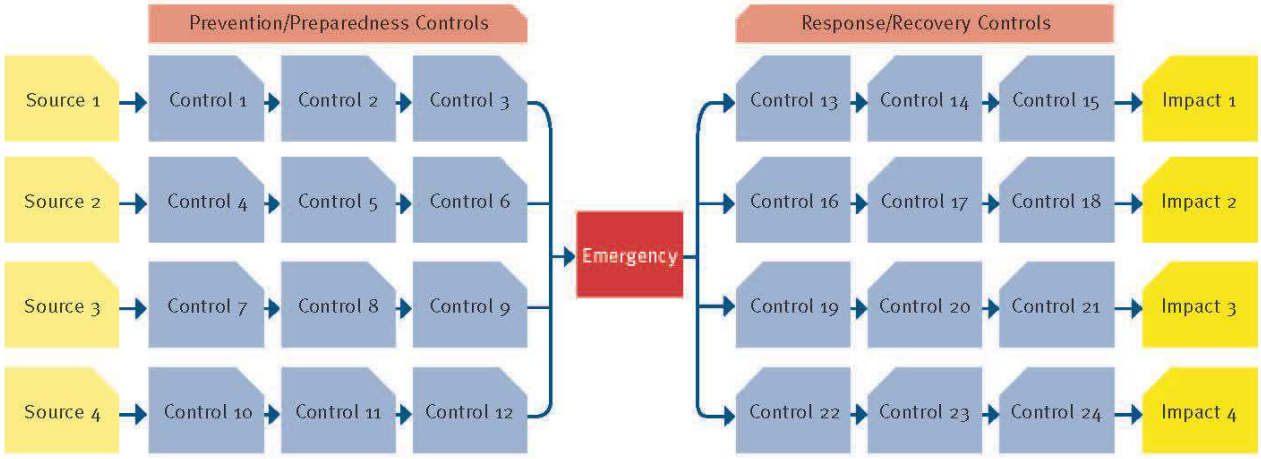
***Table 5*: Confidence Table**

| | | Confidence Levels | | |
|---|---|---|---|---|
| | | Low confidence | Moderate confidence | High confidence |
| Confidence Criteria | Data/information | Neither community nor hazard specific; anecdotal only | Community or hazard specific; validated historical or scientific | Community and hazard specific; validated historical and scientific |
| | Team Knowledge | Neither hazard nor process (risk assessment) specific | Hazard or process specific | Hazard and process specific |
| | Agreement | Neither on interpretations nor on ratings | On interpretations or ratings | On interpretations and ratings |

(NERAG AS/NZ ISO 31000:2009 pg 37)

# ANNEXURE E: BOW TIE DIAGRAM

***Figure 7***
**Example of the Bow Tie Diagram**




(NERAG AS/NZ ISO 31000:2009 pg 24)