

KEY HAZARDS & RISKS SUMMARY

Emergency Management Plan

SOUTHERN ADELAIDE ZONE



*D'Arenberg Cube, McLaren Vale, South Australia by Ian Routledge.
Image courtesy of South Australian Tourism Commission.*



Government
of South Australia

CONTENTS

INTRODUCTION	3
TOP HAZARDS AT A GLANCE	4
SOUTHERN ADELAIDE ZONE IN FOCUS	6
UNDERSTANDING OUR RISK PROFILE	7
MAJOR HAZARDS	9
1. Earthquake	10
2. Extreme Weather - Heat	11
3. Extreme Weather - Storm	12
4. Flood	13
5. Bushfire	14
CHECKLIST	15

councils

City of Marion

City of Mitcham

City of Onkaparinga

City of Holdfast Bay

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INTRODUCTION

Across South Australia there are a range of hazards including natural disasters such as bushfires, storms, heatwaves and floods that can have significant effects on peoples' health and wellbeing, along with severe impacts on communities, social, environmental and economic structures.

This is a concise summary of the Southern Adelaide Zone Emergency Management Plan (ZEMP) with information on a number of natural disasters and hazards specific to the Southern Adelaide Zone.



Glenelg Jetty, Glenelg, South Australia.

TOP HAZARDS AT A GLANCE FOR THE SOUTHERN ADELAIDE ZONE AND THEIR IMPACTS

Hazard	People	Economy	Social/ Community	Environment
Earthquake				
Extreme Weather - Heat				
Extreme Weather - Storm				
Flood				
Bushfire				

The table above gives an indication of the greatest impacts of disaster events on different aspects of the community. The extent of the impact felt is influenced by the intensity of the event, the actions taken to reduce or avoid the effects and the ability of the community, businesses and government to respond and recover.

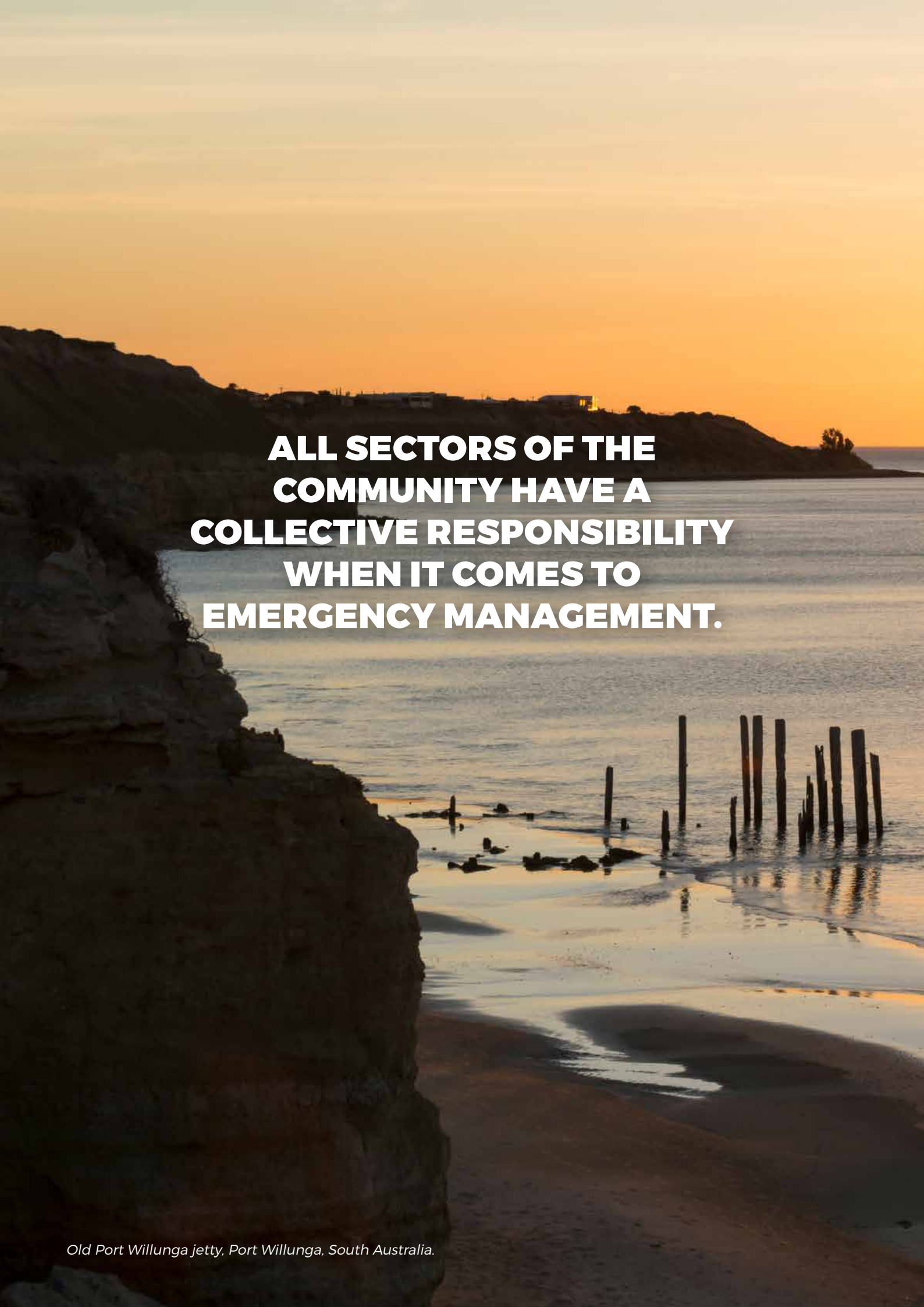
Earthquake – Adelaide is the most earthquake-prone capital city in Australia. Earthquakes occurring in urban areas pose a risk to residents and essential societal systems, including critical infrastructure. In an earthquake, it's important that you quickly **DROP** to the ground close to you, where you can avoid injury from flying debris; take **COVER** under something strong, like a sturdy table; and **HOLD** on to it until the shaking stops.

Extreme Weather (Heat) – Extreme heat causes more deaths in Australia than all other natural hazards combined. Take precautions to keep cool, take shelter from the heat and drink water; even individuals who are healthy can be affected. Never leave children or pets in cars as vehicles can quickly heat up to deadly temperatures even on relatively mild days.

Extreme Weather (Storms) – Extreme storms are more commonly observed than any other natural hazard in South Australia. To stay safe you should move vehicles under cover or away from trees; secure or put away loose items around your property and stay indoors, away from windows, while conditions are severe.

Flood – Flood is the most costly natural disaster in South Australia. It is important to be aware of flood and severe weather warnings, ensure you have adequate insurance if you live in a flood prone area and never drive in floodwaters.

Bushfire – South Australia can expect 6 or 7 serious fires every 10 years. Be prepared for a bushfire if you live in a bushfire area, and be bushfire ready by having a bushfire plan.



**ALL SECTORS OF THE
COMMUNITY HAVE A
COLLECTIVE RESPONSIBILITY
WHEN IT COMES TO
EMERGENCY MANAGEMENT.**

Old Port Willunga jetty, Port Willunga, South Australia.

SOUTHERN ADELAIDE ZONE IN FOCUS

4

councils



Population
355,341

SIZE

660
square kilometres



employment
176,838

\$12.59b

Gross Regional
Product

22,192
businesses

21%

SA's
population

16%

population
speak another
language

380

educational
facilities

MAJOR Industries

construction

Professional
Services

REAL ESTATE

FINANCE

Health Services

Retail

KEY infrastructure

Happy Valley
Reservoir

WESTFIELD
MARION

Tonsley
Innovation
District

Colonnades
Shopping Centre

HEALTH SERVICES

7

MAJOR
health
facilities

144

nursing
homes
and retirement
villages

TOURISM

McLaren Vale region
BEACHES

Morphetville Racecourse
CITY TO BAY FUN RUN

Tour Down Under
BAY SHEFFIELD

Onkaparinga River

BELAIR NATIONAL
PARK

Sturt River

**BROWNHILL
CREEK**



offshore reefs

by 2070



160+

registered
South Australian
heritage places



UNDERSTANDING OUR RISK PROFILE

Disasters are having an increasing financial and social impact on individuals, communities and businesses. There are large upfront costs for response and recovery and long-term impacts on wellbeing. The cost of disasters, both direct and intangible, are expected to rise significantly in the coming years.

In 2011, the Australian Government released the [National Strategy for Disaster Resilience](#)¹ (the Strategy). The Strategy aims to promote a shared responsibility between governments, business, not-for-profit organisations, communities and individuals. The Strategy recognises that Australians need to focus more on understanding risks relevant to their community and preparing for potential impacts.

Keeping the community informed is a key aspect in building community resilience – before an emergency to help with prevention

and preparedness, while responding to the emergency and after, to help with recovery.

This plan is a public version of the Southern Adelaide Zone Emergency Management Plan (ZEMP). The ZEMP relies on strong, cooperative, coordinated and consultative relationships among State Government agencies and local governments to work together in disasters. State Government and Local Government have plans to maintain effective service delivery to ensure that an efficient and coordinated response and recovery can be delivered to any disaster.



All sectors of the community have a collective responsibility when it comes to emergency management.

¹National Strategy for Disaster Resilience: http://www.safecom.sa.gov.au/site/emergency_management/natural_disaster_resilience_program.jsp



Jervois Street Reserve, Marion.

South Australia's emergency management arrangements involve the following activities:

- **Prevention** – actions undertaken in advance. Sometimes this is referred to as mitigation. Examples include prescribed burning or constructing flood mitigation dams, having back-up generators or alternative communication systems in place. Prevention activities occur prior to disasters.
- **Preparedness** – making arrangements, creating and testing plans, training, educating and sharing information to prepare organisations and communities before a disaster occurs.
- **Response** – the assistance and intervention during or immediately after a disaster. Focus is on saving lives and protecting community assets (buildings, roads and infrastructure) and the environment.
- **Recovery** – the coordinated process of supporting emergency-affected communities in reconstruction of physical infrastructure and restoration of emotional, social, economic and physical wellbeing. Recovery can be required for months and/or years after the disaster.



MAJOR HAZARDS

The Southern Adelaide Zone

1. Earthquake
2. Extreme Weather - Heat
3. Extreme Weather - Storm
4. Flood
5. Bushfire

Risk Assessment Process

The arrangements for the state to manage emergencies are outlined in the [State Emergency Management Plan \(SEMP\)](#).

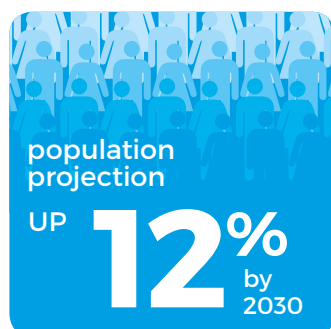
The SEMP identifies the State's eleven Emergency Management Zones. Each of these Zones has specific characteristics that are vulnerable to disasters, for example different demographics, industry, infrastructure, businesses and economic factors.

Each Zone has a Zone Emergency Management Committees (ZEMC) made up of Local and State Government and emergency management staff. These committees have a risk assurance role and provide regional leadership in emergency management in their Zones. One of their main roles is the development of a Zone Emergency Management Plan. This is important as understanding the potential impact of disasters on the region is essential for planning and preparation.

Zone Emergency Management Plans were produced by conducting risk assessment workshops with stakeholders from government and non-government organisations. These workshops used realistic scenarios about a hazard. Attendees then assessed which risks were the most likely to occur and could have the greatest impacts in the Zone.

The Southern Adelaide Zone Emergency Management Plan includes detailed information about the six relevant hazards in the Zone: earthquake, extreme heat, extreme storm, flood, and bushfire and the main risks associated with each. Information about the priority hazards and their likely impacts are detailed in the following pages.

Risk assessments used *The National Emergency Risk Assessment Guidelines* based on ISO 31000 to ensure a consistent and rigorous approach.



EMERGENCY SERVICES

17 CFS brigades
6 AMBULANCE stations
5 POLICE stations
3 SES units
4 MFS stations
1 COASTGUARD

History of Emergencies

1954
1983
2016

**DARLINGTON
EARTHQUAKE**

ASH WEDNESDAY FIRE

FLOODS AND STORMS

1. EARTHQUAKE

An earthquake is shaking of the surface of the earth caused by underground movement, such as along a fault line or by volcanic activity. They range in strength from slight tremors to major shaking, lasting from a few seconds to a few minutes and may be followed by aftershocks. Apart from the damage caused by the ground shaking, earthquakes can also lead to liquefaction (soil becoming liquid) which can cause extensive damage to buildings.

Earthquakes are measured on the Richter Scale, with 9.5 being the highest possible magnitude. Australia averages 80 earthquakes per year with a magnitude greater than 3.0. An earthquake of 5.5 is experienced approximately every two years and a 6.0 every five years.

Earthquake was considered for this Zone as it has been subject to earthquake activity in the past.

Earthquakes may cause injury and death. Damage to residential, commercial, and industrial buildings, places of mass gathering/public assembly (including schools), as well as stock and equipment is possible.

The social fabric of the community may be affected when people are unable to return to the community due to loss of houses or businesses. The tourism industry may be impacted and damage to reservoirs may lead to flooding.

- **DROP** to the ground close to you, where you can avoid injury from flying debris.
- Take **COVER** under something strong, like a sturdy table.
- **HOLD** on to it until the shaking stops.

Risk Assessment Scenarios

To understand the impact of earthquake on the Zone, the following scenarios were considered as part of the risk assessment:

Scenario 1 – 5.0 magnitude – hypothetical earthquake

- \$1.38b damage to residential homes
- \$193 million damage to commercial and industrial buildings
- 1 severe injury or death
- 1 light to moderate injuries

Scenario 2 – 5.8 magnitude – hypothetical earthquake

- \$3.25b damage to residential homes
- \$761 million damage to commercial and industrial buildings
- 52 severe injury or death
- 641 light to moderate injuries

EARTHQUAKE EVENTS

In 1883, Mount Barker experienced a 4.7 magnitude earthquake causing 1 injury. Damage could be expected up to 10kms away from the event and felt up to 125kms away.

In 1954, Darlington experienced a 5.5 magnitude earthquake causing 16 injuries and damage to buildings totalling \$90 million. Damage is expected to have occurred up to 20kms away and felt up to 250kms away.



For information on how to minimise the impact to you and your family or business visit: <https://www.sa.gov.au/topics/emergencies-and-safety/types/earthquake>

2. EXTREME HEAT

Extreme heat causes more deaths in Australia than all other natural hazards combined.

Extreme heat, also known as a heatwave, is defined as three or more days of high maximum and minimum temperatures that are unusual for that location.

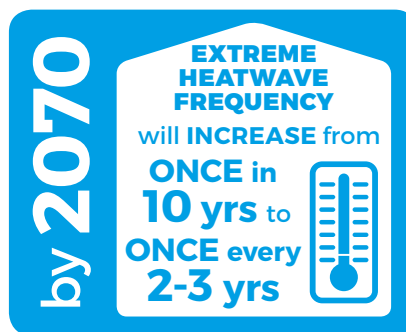
Heatwaves can be the cause of death and significant health issues in people with kidney, heart disease and mental health issues. The risk of death and serious illness is particularly high for the elderly, children, rough sleepers, travellers and those working or enjoying recreational activities outdoors.

People are encouraged to take shelter from the heat, drink water and keep cool. Never leave children or pets in cars as they can heat quickly to deadly temperatures even on relatively mild days. Heatwaves are a particular risk for anyone who does not take precautions to keep cool, even individuals who are healthy.

Stock, crops, the natural environment and infrastructure, such as power, communications, water and transport are at risk. Heatwaves can also impact the continuity of service provision from businesses and Local and State Governments. Extreme heat can also impact on health services, Local Government infrastructure and tourism.



For more information on how to minimise the impact to you and your family visit:
www.sa.gov.au/topics/emergencies-and-safety/types/extreme-heat



Risk Assessment Scenarios

To understand the impact of extreme heat on the Zone, the following scenarios were considered as part of the risk assessment:

Scenario 1 - In March 2008 a heat event with 15 consecutive days with a max temp $>37.8^{\circ}\text{C}$ (in Adelaide), caused at least \$150 million in damage and reduced income for South Australia. There was a threefold increase in heat related hospital admissions.

Scenario 2 - The January / February 2009 heat event which ran for 13 consecutive days across South Australia with temperatures up to almost 49°C recorded and over 34 deaths in South Australia.

Scenario 3 - A hypothetical heat scenario - a combination of the extended period of the 2008 event and the intensity of the 2009 event with expected breakdown of critical infrastructure such as electricity, transport network and communications. Likely impacts included increased demand on ambulance and hospitals, hundreds of deaths, outdoor work ceases and food shortages.

RECENT EXTREME HEAT EVENTS

Heat Event of 2014

- 38 deaths
- 294 heat-related emergency presentations at hospitals

3. EXTREME STORM

Extreme storms are more commonly observed than any other natural hazard in South Australia and the Zone experiences storms several times per year. Extreme thunderstorms can occur at any time of the year, however in South Australia, they are more common in spring and summer. The Zone experiences storms several times per year. The Bureau of Meteorology has identified two types of extreme storm that can impact the Zone. These are:

Thunderstorm:

- Heavy rainfall leading to flash flooding (>30 mm/h)
- Wind gusts (90 km/h or greater)
- Damaging hailstones (2cm diameter or greater)
- Tornadoes

Synoptic Storm (could include some/all of the above but also):

- Mean wind speed 63 km/h or greater (land gale)
- Storm tide/surge higher than astronomical tide causing damage/destruction to foreshore.

The extreme storm risk assessment identified a number of risks to the Zone. Extreme storms can cause injury or death, as well as increased demand on health services. Houses may become unliveable due to damage or lack of essential services. Interruption and damage to businesses as well as Local and State Government infrastructure, including coastal protection infrastructure, may also be possible. Storms may also lead to flooding and coastal inundation, and cause wastewater to impact water and ecosystems. To stay safe people should:

- Move vehicles under cover or away from trees;
- Secure or put away loose items around your property.
- Stay indoors, away from windows, while conditions are severe.

Risk Assessment Scenarios

To understand the impact of storm on the Zone, the following scenarios were considered as part of the risk assessment:

Scenario 1 – Example Adelaide hailstorm 1991

- 7-9cm hail
- \$25 million in damage (1991 value)
- 2000 private insurance claims
- \$1 million damage to new cars at Mitsubishi
- Several minor injuries

Scenario 2 - hypothetical storm – synoptically driven extreme storm event, triggering smaller scale, very dangerous supercell thunderstorms. Long-lived and widespread.

- Long term power outages
- Extensive damage to homes
- Large number of deaths and/or injuries
- Roads blocked by trees
- Health and other response agencies overwhelmed

RECENT EXTREME STORM EVENTS

September 2016 - a state-wide extreme storm led to state-wide power outages and flooding in the Zone. The storm cost \$367m to businesses state-wide.



For information on how to minimise the impact to you and your family or business visit: www.sa.gov.au/topics/emergencies-and-safety/types/extreme-storm

4. FLOOD

Key flooding sources in the Southern Adelaide Zone are the Onkaparinga River, Field River, Sturt River and other creek systems including Brownhill and Keswick Creeks. The Onkaparinga River is classified as riverine flooding, with the remainder considered to be flash flooding due to their short response times.

Flooding in the lower Onkaparinga River is significantly impacted by the Mount Bold Reservoir and a Flood Control Dam has been constructed on the Sturt River.

Urban areas within the Zone may also be impacted by localised stormwater flooding, urban flooding caused by local drainage capacity (pipes, gutters and side entry pits) being exceeded by the flow, or blocked with debris.

Coastal flooding is also an issue along significant sections of the coastline.

The assessments showed that the main risks to people were death and injury as well as increased demands on health services. There is the risk of people being unable to return to their homes due to loss or damage to their property or businesses or disruption of essential services.

Floods significantly affect the economy through disruption and damage to businesses and industry, such as tourism. Damage is possible to Government infrastructure; roads and transport (including public transport); communications; and educational facilities. Ecological damage and increased waste are also areas for concern.

It is very important to never drive through floodwaters and ensure that you have adequate insurance if you live in a flood-prone area.

! For information on how to minimise the impact to you and your family visit: <http://www.sa.gov.au/topics/emergencies-and-safety/types/flood>

Flood is the most costly natural disaster in South Australia. For the period of 1967-2013 the cost of flooding was approximate \$48 million per year.

The main types of flooding include:

Flash flooding – flooding that occurs quickly from heavy rainfall and can be very localised

Riverine flooding – flooding that occurs in a river catchment or watercourse

Infrastructure failure – including structural failure of pipes, dams or levees

Coastal inundation – that occurs from large waves from storm events

Risk Assessment Scenarios

To understand the impact of flood on the Zone, hypothetical scenarios were considered as part of the risk assessment. The impacts were:

Flash Flooding – A summer storm leading to flash flooding with a 1-2 hours duration, followed by a second heavy burst 6 hours later. Localised flooding in streets with some low lying properties inundated.

Riverine and Creek Flooding – A rainfall event causing flooding of creeks and rivers. Impacts include 150 properties inundated along Onkaparinga River, Moana Caravan Park flooded, and 30 properties inundated in McLaren Vale. Some high velocity floodwaters, including over fords.

Riverine Flooding (including Mt Bold) – A extreme rainfall event causing large scale flooding across much of the Zone. Impacts include significant outflows from Mt Bold and Sturt River Flood Control Dam causing inundation of properties, isolation of Flinders Park Medical Centre, flooding of the Patawalonga system, damage to roads and drainage infrastructure, and disruption to communications networks.

A HISTORY OF FLOODING IN THE ZONE

- 1973** Port Noarlunga flooded from Onkaparinga River as Mount Bold reservoir overflowed, exacerbated by high coastal tides.
- 1994** Flash flooding in the Onkaparinga Council district resulted in significant widespread damage in the agricultural areas.
- 2016** 75 homes evacuated in Old Noarlunga area, 80 homes damaged, 39 roads closed and one school isolated after approximately 100mm of rain fell in 24 hours.

5. BUSHFIRE

The Australasian Fire and Emergency Services Authorities Council (AFAC) defines bushfire as:

“An unplanned vegetation fire. A generic term which includes grass fires, forest fires and scrub fires.”

South Australia can expect 6 or 7 serious fires every 10 years. The Zone has a history of bushfires including Ash Wednesday in 1983.

The bushfire risk assessment showed that the main risks to people were death and injury resulting from last minute evacuations, traffic accidents and people staying to defend their homes or protect their animals. Disabled people, children, elderly, new residents, tourists, outdoor workers and emergency services personnel are especially vulnerable.

Bushfire also significantly affects the economy through disruption and damage to infrastructure, such as essential services, loss of stock and primary production, damage to, or loss of, buildings, and loss of earnings.

The social fabric of the community is affected when people are unable to return to community due to loss of houses or businesses or interruption to public services and amenities (including the health system). Psychological stress and isolation can lead to a breakdown of social networks and social unrest, while the loss of items of cultural significance can also impact on community.

Bushfire can be catastrophic for the environment, impacting on ecological communities, while the event may overwhelm Government's infrastructure and ability to rebuild.

It is important to be aware of your bushfire risk and have a plan in case a bushfire threatens your home.

Risk Assessment Scenarios

To understand the impact of bushfire on the Zone, the following scenarios were considered as part of the risk assessment:

Scenario 1 - Cygnet River Fire (Kangaroo Island) - February 2013

- 2 sheds and 1 vehicle destroyed
- 80 hectares of farm and bush land burnt
- Telstra telephone exchange damaged
- 100kms of fencing lost
- Water supply impacted, roads damaged, airport closed and tourism businesses affected
- Estimated loss > \$1 million

Scenario 2 - Ash Wednesday - January 1983

- 28 fatalities, over 600 injuries
- Estimated loss of up to \$400m (in 1983 \$ value)
- 190 homes lost
- 250,000 sheep and cattle lost
- 21,000 hectares of pine plantation burnt



! For information on how to minimise the impact to you and your family, visit: <http://www.sa.gov.au/topics/emergencies-and-safety/types/bushfire>

ARE YOU PREPARED?

Checklist

Are you prepared?

- ☐ Do you know what types of emergency and disaster might affect you?
- ☐ Does your household have an emergency plan? (more details on this page)
- ☐ In the last year, have you done anything to protect your home? (e.g. clear gutters or vegetation)
- ☐ Do you have appropriate and adequate insurance cover?
- ☐ Have you prepared an emergency kit? (visit sa.gov.au/emergencies/ and look up emergency preparation for more information)

To assist in your Emergency Management Planning, the following list provides questions to consider:

- ☐ Who will you include in the plan? Family, pets, neighbours, grandparents, children etc
- ☐ What will you do if some of you are not home?
- ☐ Consider when to evacuate during flood, storm, bushfire or other emergencies
- ☐ Where will you evacuate to? Meeting place near home, meeting place away from home?
- ☐ Can you keep your business going during and after disasters? (go to sa.gov.au/emergencies-and-safety/ for more information)

Think about the different kind of emergencies that could affect you.

Have you considered making a plan? For help with making a plan:

- **Red Cross:**
redcross.org.au/prepare
- **CFS Bushfire plan:**
cfs.sa.gov.au/site/prepare_for_a_fire/5_minute_bushfire_plan.jsp
- **Emergency plans:**
sa.gov.au/topics/emergencies-and-safety/prepare-for-an-emergency/emergency-plan

Equipment connected over the nbn™ access network will not work during a power blackout.

Make sure you have a battery powered radio and your mobile phone is fully charged.

Disasters happen - don't think if, think when!



Windy Point Lookout, Belair.

Warnings and advice can be obtained from a number of sources:



sa.gov.au/topics/emergencies-and-safety



ABC 639am



bom.gov.au for Bureau of Meteorology (BoM) weather and warnings updates including local seven day forecasts.



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