Government of South Australia

SES RESCUE

State Emergency Service

If calling please ask for: Rachel Dixon

Telephone: (08) 8115 3906

Reference: ESS-20-1895

Mr Lee Odenwalder
Member for Elizabeth
2-3, 4 John Rice Avenue
ELIZABETH VALE 5112

Dear Mr Odenwalder

I am writing in relation to your application made under the Freedom of Information Act 1991 (FOI Act) in which you requested access to the following documents:

"Any submission to, or correspondence with (including, but not limited to, emails, letters, and notes), the Independent review into South Australia's 2019/20 bushfire season."

In accordance with the requirements of Premier and Cabinet Circular PC045, details of your FOI application, and the documents to which you are given access, may be published in the agency's disclosure log. A copy of PC045 can be found at http://dpc.sa.gov.au/what-we-do/services-for-government/premier-and-cabinet-circulars.

A search has been conducted and one (1) documents was located that falls within the scope of your application. In respect of this document, I have determined as follows:

Documents 1

I have determined to release this document in full.

Appeal Rights

If you are dissatisfied with this determination, you are entitled to exercise your rights of review and appeal as outlined in the attached documentation.

Should you have any enquiries in relation to this matter, please contact Rachel Dixon, Freedom of Information Officer on telephone (08) 8115 3906.

Yours sincerely

Rachel Dixon
Accredited Freedom of Information Officer

10 August 2020

SCHEDULE OF DOCUMENTS

Freedom of Information application by Mr Lee Odenwalder – *"Any submission to, or correspondence with (including, but not limited to, emails, letters, and notes), the Independent review into South Australia's 2019/20 bushfire season".*

Doc No	Description	Determination
1	SASES Submission to Independent review into South Australia's 2019/20 bushfire season.	Release in full.

Government of South Australia

SES RESCUE

State Emergency Service

ENQUIRIES: 81153800
OUR REF: ESS-11-3045/A1321822
YOUR REF:

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Mr Mick Keelty AO APM
Independent Reviewer
South Australian 2019-2020 Bushfire Review
Level 3, 60 Waymouth Street
ADELAIDE SA 5000

Dear Mr Keelty

Re: SOUTH AUSTRALIAN STATE EMERGENCY SERVICE SUBMISSION

I refer to the Terms of Reference to the South Australian 2019-2020 Bushfire Review and our recent interview on 15 April 2020 regarding South Australian State Emergency Service (SASES) involvement and observations from the most recent bushfire season.

I hereby attach for your consideration the SASES's response to the Terms of Reference.

If you have any questions in relation to this response please direct them to me on 0429433659 or via email at chris.beattie@sa.gov.au.

Yours sincerely

Chris Beattie
Chief Officer
SA State Emergency Service

22/5/2020

Attachment: SASES Submission to the South Australian 2019-2020 Bushfire Review

SOUTH AUSTRALIAN STATE EMERGENCY SERVICE

SUBMISSION TO THE

SOUTH AUSTRALIAN 2019-2020 BUSHFIRE REVIEW

22 May 2020

Introduction to the SASES

The SASES is a volunteer-based emergency assistance and rescue service. It has a limited paid staff of approximately 65 FTE who are primarily committed to supporting 1600 SASES and 500 marine rescue volunteers in South Australia.

The SASES provides emergency assistance to the people of South Australia 24 hours a day, 7 days a week, 365 days a year. SASES is established by the *Fire and Emergency Services Act 2005* which establishes the service and provides for its legislated functions and powers. SASES is also conferred roles and functions under the *Emergency Management Act 2004* and its subordinate regulatory instruments, namely the SEMP.

The SASES is the Hazard Leader and Control Agency for extreme weather (storms and heatwaves) and the Control Agency responsible for floods. It has joint Control Agency responsibilities with the South Australian Metropolitan Fire Service (SAMFS) for search & rescue (structural collapse) which sometimes known as urban search and rescue. SASES also responds to emergencies involving road crash, marine rescue, swift water rescue, vertical rescue, land searches, animal rescues, and confined space rescues. SASES also provides operational support to other emergency service agencies.

The SASES supports the South Australian Country Fire Service (SACFS) and SAMFS during major bushfires.

During bushfires, SASES provides support to the fire agencies by:

- Erecting and managing base camps for firefighters. A base camp is a location and facility where emergency services personnel are accommodated and fed during a disaster event. A base camp usually provides catering, ablutions, accommodation facilities, water supply, waste management systems, a lighting system; and may include other facilities and functions such as car parking, maintenance and servicing.
- Providing logistical support such as transporting equipment to and from the fire ground.
- Providing support for aerial resources including refilling firebombing aircraft (SACFS manage aerial resourcing).
- Providing support to manage staging areas. A staging area is an area where resources (firefighters, trucks, water tankers etc.) are mustered and prepared for allocation to an incident. It may include the provision of welfare and equipment maintenance facilities.
- Supporting South Australia Police (SAPOL) with the conduct of impact assessments on the fire ground.
- Providing incident management support. SASES utilises the Australian Inter-service Incident Management System (AIIMS), a nationally accepted management system for any emergency. SASES trains and accredits staff and volunteers to perform functional roles within AIIMS.

SASES Submissions under the Areas of focus listed in the Terms of Reference

Prevention

Item 1 - Reducing Bushfire ignitions.

No response from the SASES.

Item 2 – Community Preparation and resilience.

No response from the SASES.

Preparation

Item 3 - State Bushfire Plan and State Bushfire Coordinating Committee.

No response from the SASES as these are the responsibility of the SACFS as Hazard Leader and Control Agency.

Item 4 – State Emergency Management Plan including Extreme Heat Planning.

SASES is the Hazard Leader and Control Agency under the SEMP for Heatwave events. SASES maintains a Heatwave Response Plan (enclosure 1) which was last reviewed in December 2019.

As the hazard leader, SASES has been collaborating with a number of South Australian and national partners to drive research and define and test evidence based interventions to reduce heat related impacts on the community. Recent findings and outcomes from SASES collaborations and research have been published and are available online[1].

Multiple stakeholder agencies are identified within the plan as having responsibilities in the lead up to, during and recovering from heatwave events. This includes implementation of a specific measures across government e.g. intelligence and reporting, Telecross REDi phone services for vulnerable people, Code Red rough sleeper services, rail transport protection measures and so on.

SASES has also led the development of a new heatwave warning service for South Australia in partnership with the Bureau of Meteorology and the Adelaide University. The new service has been well received and successfully allowed the delivery of geographically tailored emergency messaging and warnings during the two heatwaves that impacted South Australia in December 2019.

At a national level, SASES has led the establishment of a National Heatwave Working Group through the Hazard Services Forum and has been collaborating with the Bureau of Meteorology, Department of Home Affairs and other jurisdictional

[1] See for example:

- *Heat-health warnings in regional Australia: examining public perceptions and responses* available from https://www.tandfonline.com/doi/abs/10.1080/17477891.2018.1538867?journalCode=tenh20
- *Regional morbidity and mortality during heatwaves in South Australia* available from https://link.springer.com/article/10.1007/s00484-018-1593-4

authorities on the establishment of a national heatwave forecast and warnings service. Recent SASES collaborations and publications from this national work are also published online.[2]

Item 5 – State Development and Control Planning.

SASES is responsible for providing leadership in a coordinated and consistent manner to plan for, respond to and recover from hazards associated with extreme weather. Although SASES does not have direct responsibilities for land use planning, building or development, it is identified as a government agency that may be consulted on development plan amendments (DPAs) and has a role in providing advice in relation to hazard management during reviews of State planning policy and strategy.

Whilst of less relevance to this review, the SASES has established a policy position last published in 2018 (enclosure 2) on the mitigation of risks associated with extreme weather through appropriate land use planning and building controls.

In summary SASES' position advocates the creation of safer, sustainable communities through:

1. The development and regular review of hazard information relating to heatwaves, wind, storms, flood and dam burst, including:
    a. Ensuring flood hazard modelling and mapping outputs identify areas at risk from flood events including riverine flooding, sea level rise and dam burst,
    b. Consideration of local factors that influence wind hazard, and
    c. Consideration of heat island mapping (if available) and prevailing winds.
2. The sharing of hazard risk information with relevant authorities and the wider community, including engagement with communities, businesses and industries to increase awareness and understanding of risks and how to prepare for, respond to and recover from events
3. Using hazard data to inform the development of planning policy and regulations including development plans.
4. Ensuring all proposed developments or land uses are subject to an assessment of the level of risk to life, safety, health and property from extreme weather and flood events.
5. Ensuring the design, construction and location of critical infrastructure will minimise disruption (to people and the economy) during and after extreme weather and flood events.

Notwithstanding any requirements of the *Emergency Management Act 2004, Planning Development and Infrastructure Act 2016, Natural Resources Management Act 2004* or *National Construction Code*, the following policies describe the policy

[2] See for example: *Australia's future national heatwave forecast and warning service: operational considerations* available from https://www.bnhcrc.com.au/publications/biblio/bnh-4767

position of SASES relating to land use planning and building design and construction:

- An ‘all hazards’ approach should be applied to decisions relating to land use planning and the design and construction of buildings and infrastructure.
- All levels of decision making in land use planning and building control should be responsible for considering the potential impact of extreme weather events.
- The impact of future climate conditions on the frequency and intensity of extreme weather events should be considered in decisions relating to land use planning and building design and construction.
- Development should not increase the risk of flooding on adjoining areas.
- Development should not increase the risk of landslip.
- Development should not rely on flood levees or flood control dams for protection from flood inundation.
- New dam approval should require applicants to consider the potential consequences of dam failure.
- Hazardous materials should be stored and located to minimise the risk of escape during extreme weather or flood events.
- Road provision should provide adequate access/egress during an extreme weather or flood event. Proposed development should not impede or block access/egress routes of existing developments.
- Buildings, streetscapes and neighbourhoods should be designed to enable safe evacuation.
- Building and infrastructure design and construction should be structurally adequate to withstand expected depth and velocity of flood flow, maximum probable wind speeds, hail loading and extreme heat.
- Residential buildings should be designed and constructed to minimise heat and cold stress and provide year-round thermal comfort while reducing reliance on artificial heating and cooling.
- Buildings, infrastructure, streetscapes and neighbourhoods should be designed to mitigate the impacts of extreme heat, including through the installation of green infrastructure.

Each of these policy statements are consistent with SASES’ mission to minimise the loss of life, injuries and damage from emergencies and natural disasters. They are also consistent with SASES’ role in preventing extreme weather and flood events adversely impacting on community health and safety, homes, businesses and the State’s infrastructure.

Whilst SASES maintains a policy in relation to land use and development, it has no dedicated resources for the purposes of providing advice or responding to DPAs that may be referred to it. In light of this the SASES policy position is simply provided to the referring authority or developer. SASES has no capacity to consider to what extent any development or DPA aligns with the intent or directions contained in its policy statements.

Response

Item 6 – Call taking and dispatch.

The SAMFS Communications Centre (ComCen) manages approximately 32,000 calls to the fire services and SASES via Triple Zero (000), calls to the SASES assistance line (132500) and the Bushfire Hotline (1800 362 361). The ComCen performs call receipt and dispatch (CRD) functions for SAMFS, SASES and SACFS.

The SA Computer Aided Dispatch (SACAD) system supports CRD functions in the ComCen. It provides the database of maps, hazard response areas, agency resources and risk based dispatch plans and backup response plans for each agency.

The Emergency Services Sector (ESS) maintains two SACAD databases within which incidents are created and resources dispatched. These are the Fire CAD and the SES CAD. Separate SACAD systems also support CRD functions for South Australian Police (SAPOL) and the South Australian Ambulance Service (SAAS) from their respective communications centres.

SAPOL and SAAS SACAD databases can automatically generate a recommended dispatch for ESS resources via inter-CAD requests into the fire SACAD (but not the SES SACAD). .

Whilst of less relevance to this review, during storm and flood events, there are a very high number of calls to the CommCen for assistance. The ComCen may receive hundreds of calls in an hour and emergency services can be responded to thousands of jobs over a few days.

During high end severe weather events, there are significant complexities that can make resource allocation particularly difficult, and time-consuming. Much of this complexity arises from there being two separate instances of the SACAD system - one for fire agencies (SAMFS and SACFS) and one for SASES. The rules governing the number of resources dispatched and the priority of response required are different in the two systems and the systems do not interact with each other. Incidents that require a dual fire and SASES response need to be entered by the operator into both SACAD systems but the same job is identified with differing incident numbers. This can lead to confusion when coordinating response and clearance of jobs during large scale multi incident events.

If an incident/response is created on one instance of the SACAD and then allocated to an agency on the other system, the ComCen operator must cancel that job and create a new job in the other system which creates additional workload.

When resources from different agencies are sent out on the two different systems there is no visibility to responding agencies as to which other resources (if any) are actually being responded.

During such events the dispatch of resources to a very large number of incidents is challenging and requires secondary triaging at local levels to ensure a coordinated approach when managing scare resources for response. SES units use a

combination of pager messages, Respond52 notifications and the incident board on SES Incident Information Management System (SESIIMS) to receive and coordinate taskings. These systems help local SES units deal with the complexity that arises from the need to locally triage multiple jobs that are being stacked and managed at unit-level.

Other more routine challenges for SASES that arise from CRD and operations within the ComCen are identified through SASES SACAD grievance processes. In general these relate to:

- Operator Error - A ComCen operator makes an error e.g. wrong event type, omits sending stop-call or attaching a resource to a job, incorrect process followed, not providing information updates to correct response information.
- SASES incident not created - An incident is created on the Fire CAD but not the SES CAD when SASES should have been responded.
- Choice of event type - An event type is chosen that responds a SAMFS resource instead of a SASES resource e.g. Road Crash Rescue over a Vehicle Accident or an Assist Resident.
- Accuracy of Intercad information - The Intercad, which pushes responses from the SAAS or SAPOL CAD, is sometimes less accurate (particularly in terms of precise location).
- Direction from Senior Officer to change/ escalate response - Senior ComCen Officer instructing manual over-ride of SACAD recommendation resulting in different resources being responded than agreed by agencies.
- Inaccurate information provided by caller - Callers are often under stress and may provide incorrect information or they do not know exactly where they are.

Many of these issues are largely explained by the complexities associated with the dual SACAD systems, unintended operator errors and . SASES is the only agency without a dedicated officer to support SACAD response planning and coordination located within the ComCen. This is inconsistent with the resourcing for SACFS and SAMFS both of which have dedicated FTE that work with SACAD systems staff and who are located at the ComCen.

Notwithstanding the explanations and reasons for the issues they do have a cumulative impact on the efficiency of response, volunteer morale and negative perceptions with regard to the SAMFS management of the ComCen.

Item 7 – Equipment and resources.

<u>AVL</u>

Automatic Vehicle Location (AVL) systems are designed for tracking vehicles through GPS technology, enabling visibility of vehicle location for incident controllers. AVL systems are cloud based applications that provide accurate, near real time location and status of emergency response vehicles 24/7. Additional features can include distress alarms and automated alerts for vehicles entering and leaving defined areas. AVL systems are reliant on cellular network GPS unless a satellite

service is utilised. AVL for emergency services may require that a satellite service be used as a back up to cellular GPS to remove any vulnerability.

SASES supports the implementation of AVL in emergency response vehicles to assist in the management of response activities by the IMT. When working on or closely around a fireground or flooded areas it provides an extra level of safety for emergency services workers.

The adoption of AVL in South Australia's emergency services has been actively pursued by the emergency services sector since the Wangary Fire of 2005 but despite best endeavours of all agencies, the capability has not been realised.

- Following the Wangary Fire of January 2005, the SACFS established an internal investigation into bushfire, referred to as Project Phoenix. The fire was also the subject of an independent parliamentary inquiry, and a Coronial Inquest. The Project Phoenix report recognised the role of AVL and mobile data technologies and identified actions to "…Investigate automatic location equipment on appliances to assist with location determination" and "identify a functional system for locating and tracking assets".
- In 2009 the then Department of Justice developed a comprehensive business case on behalf of the sector with a projected upfront capital cost of $14.144 million and an ongoing operating cost of $1.558 million for the preferred solution.
- In February 2010, a pre-election promise was made by the then Premier committing additional funding to support implementation of AVL on all emergency services vehicles.
- In 2012, SAFECOM prepared a business case for ESS funding for AVL for all emergency services vehicles (upfront cost of $13.8 million) and a revised case in 2013 ($7 million) both of which were not supported by the Government of the day.
- In late 2014, the SASES in partnership with the then Department of State Development launched a Small Business Challenge and committed $500,000 towards the development of an AVL solution and electronic responder check-in system with tracking capability for South Australia's ESS. Of five feasibility studies undertaken two proposals were considered worthy of further development, however funding was not made available halting any further work.
- Post event reports into Sampson Flat, Pinery and the September 2016 extreme weather event have all recommended the provision of AVL for emergency services vehicles. Recommendation # 26 of the Burns Review was that AVL and associated personnel resource tracking be implemented within the ESS.
- Subsequent budget bids have been prepared by the sector but funding has not been secured through the budget process.

Mobile data is well established as key enabling technologies for modern fire and emergency services organisations throughout the developed world, and is already

being used to good effect by SAPOL, SAAS, DPTI, utilities and a host of private sector businesses and other organisations.

SASES' position is that the absence of AVL on South Australian emergency response vehicles remains a significant capability gap, particularly in the context of rural fire but also in the context of floods, storms and more routine despatch and/or diversion of emergency response vehicles "on the move" via an integration to SACAD and associated CRD systems.

Basecamp

The SES has an operational role to supply and manage basecamps during major emergencies such as campaign bushfires or floods. Basecamps are established to provide accommodation for frontline responders (fire fighters and other emergency services personnel) who are deployed to the emergency incident. Basecamps can also be used as emergency temporary accommodation for citizens displaced from their homes during or following an emergency and for other temporary accommodation needs.

In 2018, SASES procured a cache of the Humanihut system as a replacement for previous arrangements that utilised small nylon tents (2-3 person) for basecamp accommodation. The cache has sufficient capacity to accommodate 128 people (planning target).

The basecamp cache comprises 32 air-conditioned sleeping huts, six shower blocks, portable generator, water dams, gas water heaters and associated electrical and plumbing infrastructure and services, bunks, sleeping bags, pillows and other basic camp and logistics equipment. The cache is supported with additional infrastructure and services that are contracted on a needs basis such as mobile kitchens and leased portable toilets.

The Humanihut system has been utilised a number of occasions since acquisition and more extensively during the Kangaroo Island bushfires where the deployment of the Humanihuts for large scale Base Camp was undertaken for the first time. Whilst the new accommodation system was well received and commented on favourably by the other organisations involved the deployment clearly demonstrated that the current 128 person camp is insufficient to accommodate the required number of personnel for any significant emergency response operation.

At the height of the Kangaroo Island fire emergency, SASES was accommodating up to 450 personnel. This required denser occupation of the huts (occupancy lifted to six) and the use of a marquee and small tents (2-3 person) for accommodation. The additional numbers also created capacity challenges for base camp resources and infrastructure such as showers, washing facilities, ablutions and camp management personnel.

Overloading the infrastructure and use of tents for accommodation gives rise to several risks: importantly, fatigue resulting from inadequate rest and recovery can lead to potentially unsafe work practices and poor decision-making, delays in the

availability of basecamp services due to limitations on possible sites and the time required to establish and finally, poor morale and difficulties attracting and retaining volunteers willing to participate in protracted events due to the uncomfortable and inadequate amenities.

This situation could have been much worse had the Cudlee Creek, Eyre Peninsula and/or South East fires required basecamp facilities at the same time. Currently, the Humanihut cache can only be deployed to one location at a time.

Improvements to basecamp infrastructure capacity would enhance the fire and emergency services sector's capacity to support frontline personnel, and ultimately South Australia's ability to provide emergency response services to the community.

Such acquisitions could not be accommodated from within SASES' existing annual capital program and operating budgets and would require support and financial commitments from Government.

Remote Piloted Aircraft

Remote Piloted Aircraft (RPA) are a rapidly developing resource in the SASES with increasing numbers of qualified pilots and equipment located across the state. The RPA aircraft are a valuable resource for search and rescue operations. Whilst they have the potential to assist greatly in bushfire situations by using infrared technology to seek hot spots on the fireground, this capability has not been developed or deployed.

Similarly, RPAs have potential also be of use in Rapid Damage Assessment and in enabling more rapid assessment in areas such as stock losses. Developing this capability would require additional resources to acquire and integrate the technologies and developed pilots and analysts skilled to acquire and interpret field intelligence captured in this manner.

Item 8 – Incident Management and emergency coordination.

SASES utilises the Australian Inter-service Incident Management System (AIIMS), a nationally accepted management system for any emergency. SASES trains and accredits staff and volunteers to perform functional roles within AIIMS and, on request from the SACFS, provides these qualified personnel to assist the SACFS in incident management teams (IMT) and the SACFS reciprocates.

Over the fire season, SASES provided qualified personnel to CFS to support IMTs and deployed personnel to NSW as part of various South Australian combined agency IMTs that were sent to support that jurisdiction. The SASES is currently providing qualified incident management practitioners to assist PIRSA in their response to Fruit Fly outbreaks in the Adelaide metropolitan area and up until mid-May 2020 was supporting the State Control Centre – Health with the response to the Covid-19 pandemic.

The provision of IMT personnel to support the Control Agency is considered appropriate and consistent with the legislative functions of SASES. This supports the

Control Agency and also allows individuals to gain more experience in incident management roles making them more effective for agency duties during severe weather and flooding events.

The internal debriefs held relating to the SASES involvement in the Kangaroo Island response raised a number of issues including:

- The need for improved coordination arrangements between the Control Agency and Support Agencies around movement of crews and equipment requested from the Support Agency.
- The need for better communication out of the Incident Management Team to Support Agency responders concerning their roles, functions and support.

Both of these will be followed up within the SASES and where necessary with the SACFS where their assistance may be required.

Item 9 – Public Information and warnings.

SASES has no comment to make with respect SACFS public information and warnings activities over the fire season.

The SASES uses it's own recently developed SESIIMS Alerts Module which is an end-to-end system that creates, publishes and expires alerts and warnings. This is separate from the SACFS system as they each address different risks with different messaging, although common terminology applies wherever possible.

SASES has experienced the challenges of delivering and managing public information and warning messages during periods of high operational tempo and is acutely aware of the heavy demands placed on public information and warnings officers.

SASES has a limited pool of trained and experienced staff who perform public information, media, digital/social media and warnings roles. There have been many severe weather events where SASES resources for public information and warnigns has been stretched and on occasions exceeded.

SASES' position is that consideration should be given to creating a pool of public information and warnings officers from across government agencies who could be trained to support all emergency service operations especially during prolonged events.

Item 10 Interstate Deployments.

The SASES assisted the SACFS in supplying a number of incident management qualified personnel to work in NSW this fire season. The SASES has a growing number of incident management practitioners and has provided these resources to the fire services domestically and interstate when requested.

The coordination of resource sharing arrangements for the bushfires in the eastern states was undertaken by the AFAC National Resource Sharing Centre (NRSC). The SASES provided a large proportion of the staff for that organisation with twelve staff and three volunteers being deployed over December and January as Deployment Managers, Duty Officers and Admin Support.

An internal debrief has been undertaken by the SASES and will be discussed with the NRSC in the near future.

Recovery

SASES supplied Rapid Damage Assessment (RDA) teams to work on Kangaroo Island and at Cudlee Creek under the direction of SAPOL. These teams used SASES hardware (tablets) with SAPOL logons to record their findings for use by the IMT and in recovery.

The distinctions between level 1, level 2 and level 3 assessments appear to be not well understood and there was some confusion at Cudlee Creek as to which agencies were coordinating RDA. Assessments undertaken by SAMFS were captured with a different system and differing data format to the assessments undertaken by SAPOL and SASES. SASES considers there is opportunity to better coordinate and manage RDA data collection.

SASES did not deploy RPA in support of RDA activities however as per this submission's response to terms of reference item 7 above, SASES considers there is opportunity to enhance the timeliness and effectiveness of RDA data collection through the development and integration of RPA capabilities for this purpose. Additional resources would however be required to achieve this.

Enclosures

1. SASES Heatwave Response Plan 2019
2. SASES Land Development Policy – Extreme Weather and Floods

SASES Heatwave Response Plan

A Plan providing strategic guidance for effective emergency response to heatwave events occurring in South Australia

Government of South Australia

SES RESCUE

A reliable and trusted volunteer based organisation building safe and resilient communities.

FOR OFFICIAL USE ONLY

Document Control Sheet

Prepared by

Name	Position
Christina Retsas	Operations Planning Officer

Document Approval

This document has completed the Management of Change Approval process, and has been approved and authorised for release by:

Approver	Position	Signed MOCAF	Date
Dermot Barry	A/Chief Officer	A1249752	11/12/2019

Document Management

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Document Confidentiality Classification

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	☐ Protected	☐ Confidential	☐ Secret

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Tables

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1. INTRODUCTION

The SASES Heatwave Response Plan has been developed under current state emergency management arrangements outlined in the State Emergency Management Plan (SEMP) where the South Australian State Emergency Service (SASES) is both the hazard leader and control agency for Heatwave events, previously known as Extreme Heat events.

In 2019, SASES replaced the use of extreme heat with heatwave, to align the terminology with the Bureau of Meteorology (BOM).

Related documents

The following documents may inform this plan:

- State Emergency Management Plan (Mar-19)
- SA Government Extreme Heat Communications Plan (Nov -18)
- SES-OPS-PLN-001 SASES Control Agency Plan (Sep-19)
- SES-OPS-PLN-002 SA Extreme Weather Hazard Plan (Oct-18)
- SES-OPS-MAN-012 SASES State Control Centre Manual (Dec-17)
- SES-OPS-MAN-021 SASES Incident Management Manual (Jul-19)
- SES-PIM-GUI-005 SASES Key Messages Guideline (Sep-18)
- SES-WHS-MAN-001 SASES Work Health and Safety Manual (Jun-17)
- SES-WHS-GUI-002 Working in the Heat Guideline (Apr-19)
- Memorandum of Understanding between the Commonwealth of Australia Represented by the Bureau of Meteorology and the SA Country Fire Service (Sep-15, A467334)
- SESIIMS Major Event Access (Oct-16, A621171)

1.1 Purpose

The purpose of this plan is to provide strategic guidance for effective emergency response to heatwave events occurring in South Australia. The plan outlines the heatwave arrangements within South Australia including:

- The roles and responsibilities of agencies and organisations that have a role in managing the impacts of heatwave events
- Defined triggers for actions for Government agencies and stakeholders
- Associated alerts and warnings and dissemination of information to the community and a role to minimise the threat and impact to people, property and the environment
- The strategic control priorities, the response management and coordination arrangements

The Plan relies on strong cooperative, coordinated and consultative relationships among State Government departments and agencies, local councils and other specialist organisations or key stakeholders.

This Plan is based on the all hazards principles as endorsed under the state emergency management arrangements.

1.2 Scope

This Plan is prepared for SASES volunteers and staff in providing its response as the Control Agency to heatwaves.

1.3 Activation of the Plan

This Plan will be activated by SASES to align with the BOM heatwave service which generally operates between October and March. Should there be a requirement to activate this Plan outside this period, consultation will occur between the SASES State Duty Officer (SDO), Chief of Staff (COS) and State or Deputy State Controller.

1.4 Exercising and evaluation

If not activated for an actual heatwave event, this Plan will be exercised within two (2) years from the date of approval. The exercise will be evaluated and where improvements to the emergency management and operational arrangements in this plan are required, the plan will be amended and a revised version issued.

1.5 Review

A review of this Plan will occur if an activation has occurred and will consider debrief comments and recommendations, changes to the SASES Extreme Weather Hazard Plan or changes to relevant legislation or the SEMP.

1.6 Document management

This Plan, associated documents and outputs (e.g. plans, minutes, reports, photographs, maps etc) will be stored in Objective.

This plan, associated documents and appendices can then be linked to the SES Incident and Information Management System (SESIIMS) within the SESIIMS File Library. This will provide access for external agencies as required.

1.7 Glossary

The following abbreviations and terms are used within this document.

Term	Description
AUSLAN	Australian Sign Language
BOM	Bureau of Meteorology
CALD	Culturally and Linguistically Diverse
COS	SASES Chief of Staff
DEM	Department for Energy and Mining
DEW	Department for Environment and Water
DHS	Department of Human Services
DPC	Department of the Premier and Cabinet
DPTI	Department for Planning, Transport and Infrastructure
EHF	Extreme Heat Factor
EPA	Environmental Protection Authority
FES Act	Fire and Emergency Services Act (SA)
FSG	Functional Support Group
IMT	Incident Management Team
LGA	Local Government Association
OPORD	Operations Order
PIRSA	Department of Primary Industries and Regions, SA
RDO	SASES Regional Duty Officer
SAAS	SA Ambulance Service
SACFS	South Australian Country Fire Service
SAFECOM	South Australia Fire and Emergency Services Commission
SAMFS	South Australian Metropolitan Fire Service
SAPN	SA Power Networks
SAPOL	South Australia Police
SASES	South Australian State Emergency Service

SCC	State Control Centre (SASES)
SDO	SASES State Duty Officer
SEC	State Emergency Centre
SEMP	State Emergency Management Plan
SESIIMS	SES Incident and Information Management System
SITREP	Situation Report
SRO	State Recovery Office

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2. STAKEHOLDERS

There are a number of key stakeholder relationships that ensure the effective management of heatwave events in South Australia. Stakeholders have been identified as either key stakeholders or other stakeholders that assist as a support agency or provide intelligence.

2.1 Key stakeholders

This section identifies the key stakeholders and their roles and responsibilities that are relevant to this plan.

2.1.1 SA State Emergency Service

The SASES has its functions, and powers, identified in s.108 and s.118 of the *Fire and Emergency Services Act 2005*, which includes carrying out prevention, preparedness and response operations under the *Emergency Management Act 2004*.

SASES is the designated Control Agency for extreme weather (including heatwaves) and issues public warnings of the potential impacts to the community and leads the response to the extreme weather events.

As the Control Agency for extreme weather under the SEMP, the responsibilities of SASES are identified in Table 1.

	Responsibility	Role
1	Command and Control	Take control of the response to the emergency (including the appointment of an incident controller and incident management structure)
2	Safety	Ensure a safe working environment and systems of work
3	Communications	Ensure effective liaison, communication and cooperation with all involved
4	Intelligence	Continually assess the situation, identify risks and share information with all involved
5	Planning	Develop and share plans and strategies that meet the requirements of all agencies responding to the emergency (an incident action plan)
6	Operations	Implement and monitor the incident action plan
7	Logistics	Ensure the effective allocation and use of available resources
8	Public Information	Ensure the public is adequately informed and warned so as to enhance community safety
9	Investigation	Facilitate the investigation of the emergency and review of response activities
10	Recovery	Ensure transition from response to recovery, including and coordinate handover to the state recovery arrangements

Table 1: Control Agency responsibilities

2.1.2 Bureau of Meteorology

The Bureau of Meteorology (BOM) is the commonwealth government agency responsible for the provision of weather forecasting and climate data, across Australia, including South Australia.

The BOM provides a Heatwave Service which operates between the start of October and the end of March. The Heatwave Service provides information about heatwave severity, including a Heatwave Forecast which

consists of a panel of five maps across Australia for the next five three-day periods. Each map shows areas where heatwave conditions are forecast to occur and also indicates whether their intensity is expected to reach severe or extreme status.

2.1.3 SA Health

SA Health provides advice to persons in South Australians on the most appropriate ways to manage the heat and minimise the impact on their health.

The SA Health – Extreme Heat Strategy is intended for use across SA Health, the Local Health Networks and SA Ambulance (SAAS) to guide Health Services in developing and maintaining their localised, contextual arrangements.

Additional information has been developed in the form of fact sheets focusing on specific topics, or for specific audiences. The fact sheets are available for download from the SA Health website and include a number of translated factsheets to cater for culturally and linguistically diverse (CALD) communities.

SA Ambulance Service

The SA Ambulance Service (SAAS) has Extreme Heat Event Arrangements to ensure an effective, efficient and sustained emergency response to predictable increases in demand on their business during prolonged periods of elevated temperature.

SAAS is also the lead agency for the Ambulance and First Aid Functional Support Group (FSG).

2.1.4 Housing SA

Housing SA is responsible for activating a Code Red to boost homelessness services during heatwaves. The Code Red means homelessness agencies will increase their services to reduce the harmful effects on people rough-sleeping by:

- Connecting them with support services
- Providing additional services including extended operating hours for services, increased shelter options, additional food services, sunscreen etc

Housing SA is also the lead agency for the Emergency Relief FSG. It establishes relief and recovery centres to support the affected community towards management of its own recovery.

2.1.5 Department for Human Services

The Department for Human Services is responsible for activating the Telecross REDi phone service – a service run by the Australian Red Cross that provides free welfare checks at regular intervals during heatwave events. Those registered can receive a phone call up to three times a day to check on how they are coping and the trained Red Cross volunteers can also provide tips to stay cool or activate an emergency procedure if required.

2.1.6 Department of Planning, Transport and Infrastructure

The Department of Planning, Transport and Infrastructure (DPTI) will communicate to relevant stakeholders in a timely manner the impact heatwave can have on the provision / suspension of transport services specifically to the general public with a particular focus on the elderly, young people and those with pre-existing medical conditions.

2.1.7 Department of Primary Industries and Regions SA

During a heatwave, Primary Industries and Regions SA (PIRSA) ensures that employees, primary producers, hobby farmers, pet owners, industry and the general public have access to relevant, timely and accurate information to keep themselves and their animals healthy and safe.

2.2 Other stakeholders

The stakeholders identified below in Table 2 are either support agencies or provide intelligence which is collated and reported to stakeholders.

2.2.1 Government agencies

Organisation	Responsibility
Department for Education	• Schools and childcare centres
Department for Mines and Energy (DME)	• Matters relating to infrastructure including power, gas and telecommunications
Department for Environment and Water (DEW)	• Park closures • Lead agency for Mapping FSG
Department of Defence	• Provide support to SASES during emergencies as required • Lead agency for Defence FSG
Department of the Premier and Cabinet (DPC)	• Provides access to public resources and all of government communication
Environmental Protection Authority (EPA)	• Matters relating to potential contamination and/or disposal of carcasses
Local Government Association (LGA)	• Provides link to all local government councils • Lead agency for Local Government FSG
SA Country Fire Service (SACFS)	• Provides support to SASES during emergencies as per the FES Act
SA Metropolitan Fire Service (SAMFS)	• Provides support to SASES during emergencies as per the FES Act
SA Police (SAPOL)	• Lead agency for Government Radio Network FSG • Lead agency for Public Information FSG
SafeWork SA	• Provides advice to outdoor workers during heatwave and provides statistics of heat related incidents

Table 2: Stakeholders and their responsibilities

2.2.2 Functional Support Groups

Functional Support Groups (FSG) identified in Table 3, comprise of both government and non-government agencies that perform functional roles to support the Control Agency or Support Agencies. FSGs operate within the State Emergency Centre (SEC).

Functional Support Group	Responsibility	Lead
Ambulance and First Aid	• Provide coordinated emergency ambulance response	SA Ambulance Service
Defence	• Assistance to the civil community	Australian Government Department of Defence
Emergency Relief	• Identify and coordinate the provision of practical advice and psychosocial support services required by individuals, families and communities through relief, recovery centres and outreach	Housing SA
Engineering	• Coordinate the protection and restoration of essential infrastructure including: o Water supply and sewerage o Public and private buildings, including structural assessment, demolition and shoring up o Telecommunications, gas and power infrastructure	SA Water
Government Radio Network	• Oversee and manage the Government Radio Network resources	SAPOL
Local Government	• Coordinate response from local government during an emergency	LGA
Logistics	• Coordinate non-specialist supply and catering support	SAFECOM
Mapping	• Provide timely, accurate and integrated spatial information and incident mapping products	DEW
Public Information	• Provide strategic oversight of public information promulgated to the community	SAPOL

Table 3: FSG and their responsibilities

3. BACKGROUND INFORMATION

This section provides background information about heatwaves in South Australia. Refer to Section 5.1.2 and 5.2.2 of the SA Extreme Weather Hazard Plan.

3.1 South Australia weather overview

Heatwaves can result in significant health stress especially on vulnerable people. More people die as a result of heatwave than other natural disasters, however in many cases this can occur well after the heatwave has passed. Often the cause of death during a heatwave is difficult to determine, at the time as many people who die during a heatwave have a pre-existing or contributing health condition.

South Australia experiences warm to hot weather between September and May during the following seasons:

- Spring – September, October and November
- Summer – December, January and February
- Autumn – March, April and May

Extremely hot temperatures can be experienced during January and February where temperatures may regularly exceed 40 degrees Celsius, particularly impacting Adelaide and Regional areas north to the Northern Territory border.

Table 4 reflects the highest temperature and lowest temperature for the 24 hours leading up to the observation for the period October 2018 till April 2019, recorded at 0900hrs daily.

Major Centres	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Adelaide (Kent Town)	(max) 35.6	36.6	43.7	47.7	39.8	42.2	33.98
	(min) 14.5	*16.7*	*17.6*	*24.0*	*21.1*	*17.5*	*18.4*
Whyalla (Aero)	(max) 38.8	38.1	46.8	48.5	43.1	41.4	36.7
	(min) 17.0	*18.2*	*17.7*	*24.2*	*22.1*	*19.7*	*17.4*
Pt Augusta (Aero)	(max) 39.8	40.3	47.7	49.5	44.7	43.1	36.8
	(min) 19.7	20.7	21.9	26.2	24.3	19.2	21.3
Roxby Downs (Olympic Dam Aero)	(max) 39.9	40.8	46.1	47.8	44.0	41.5	35.3
	(min) 23.5	22.2	23.2	24.5	26.7	22.4	21.9
Mt Gambier (Aero)	(max) 27.5	33.7	36.7	44.0	37.1	40.5	32.9
	(min) 13.8	14.3	15.9	20.0	17.9	15.2	14.6

Table 4: Highest daily / lowest daily temperatures Oct '18 – Apr '19

3.2 Impacts

Risk assessments, such as the BOM risk management reports, extreme storm risk management reports and heatwave risk management reports inform Zone Emergency Management Plans.

Heatwave events impact the health and welfare of the community. They also have the potential to impact on critical infrastructure such as power networks, water lines, and transport services affecting trains and trams.

3.2.1 Heat related illnesses

Heatwave events can impact on the physical and mental health of people throughout the state. Those most at risk are older people, young children and people with a medical condition.

Heat related illnesses can range from mild conditions such as a rash or cramps to very serious conditions such as heatstroke, which can kill. Heat kills more Australians than any other natural disaster.

Heat related illnesses include:

- Dehydration
- Heat cramps
- Heat syncope (dizziness and fainting)
- Heat exhaustion
- Heat stroke

3.2.2 Economy

Heatwave causes economic impacts throughout the state by preventing business from functioning as normal. This can be due to loss of essential utilities and services, mechanical failure of industrial machines or inability of staff to attend their place of employment. Infrastructure such as roads and rail may be damaged, water lines may burst and power transformers may overheat. Industries that employ outdoor workers are also affected. Frequent extreme heatwaves are likely to increase productivity risks for agriculture, forestry and fisheries with impacts including:

- The potential to affect agricultural yields
- Place livestock at greater risk of heat stress, reducing livestock productivity and reproductive rates
- Increased risk of declining productivity and tree mortality in some regions as a result of reduced rainfall, increased temperatures, natural disasters and water loss
- Crops and horticulture are facing changes in growing season and changed frequency and intensity of heatwaves and storms

3.2.3 Social setting

Community morale can be impacted by loss of earnings resulting from heatwave events. Damage or failure of transport, communications and other infrastructure can also result in psychological and emotional stress across the community.

3.2.4 Environment

Heatwaves contribute to catastrophic fire weather conditions. There can also be an increase in blue-green algae and other water quality related risks in river systems and waterways.

3.3 Weather Forecast Areas

The BOM provide weather forecasting for fifteen designated weather forecast areas: Adelaide Metropolitan, Mount Lofty Ranges, Yorke Peninsula, Kangaroo Island, Upper South East, Lower South East, Murraylands, Riverland, Mid North, Flinders, West Coast, Eastern Eyre Peninsula, Lower Eyre Peninsula, North West Pastoral and North East Pastoral.

3.3.1 Background

The BOM has developed a statistical model that can be applied at multiple locations across the state. It produces an indicator, (i.e. Excess Heat Factor (EHF)) that is specific for each location at which the model is run and thus provides a more meaningful gauge for warnings.

In conjunction with the Adelaide University, a tool has been developed that takes the raw BOM EHF data, interprets it, and then presents the output in a readable format, mapping and a table of impacts based around weather districts.

Excess Heat Factor severity

The Excess Heat Factor (EHF), is calculated based on average daily temperatures over three consecutive days. This is measured in relation to the local long-term climate (by comparing the three days to a climatological threshold for that particular location) and to the local recent past (by comparing the three days to observed temperatures over the previous thirty days at that particular location). Refer Appendix A.

Heatwave Intensity

The intensity of heatwaves are classified into three types, based on intensity. Comparing forecast temperatures to the last 30 days of temperatures allows us to gauge the size of the temperature change, physical and behavioural preparedness for such heat, and how challenging it could be for people and infrastructure:

Low-Intensity Heatwave

Low-intensity heatwaves are common in South Australia during summer and most people have the capacity to cope with this level of heat but begin to see health effects. The very young, elderly or those with medical conditions should take care.

Severe Heatwave

Severe heatwaves are less frequent and are especially challenging with an increase in morbidity and mortality for vulnerable groups such as babies and young children, the elderly, pregnant women and those with chronic illness, but even healthy people should take care. SASES will issue a separate Watch and Act message for each area in which a severe heatwave is forecast.

Extreme Heatwave

Extreme heatwaves are rare, but dangerous for anyone who does not take precautions to keep cool, even those who are fit and healthy. People who work or exercise outdoors are particularly at risk. The reliability of infrastructure, like power and transport, can also be affected. SASES will issue a separate Emergency Warning message for each are in which an extreme heatwave is forecast.

Further information on Excess Heat Factor severity calculations and Heatwave intensity can be found in Appendix A.

Heatwave Information reports

The heatwave forecast and warning decision support tools will be provided to the SASES by the University of Adelaide on a daily basis over summer and initially include:

- Heatwave Severity Assessments and Forecasts by Weather Districts
- Enhanced heatwave severity maps
- Severity Assessments
- Forecasts by Cities and Towns in South Australia

Appendix A and B provides an explanation on:

- District Summary table
- Forecast maps.

3.3.2 National Heatwave Forecasting and Assessment Service

Heatwaves are calculated using the forecast maximum and minimum temperatures over the next three days, comparing this to actual temperatures over the previous 30 days, and then comparing these same three days to the ‘normal’ temperatures expected for that location.

The National Heatwave Forecasting and Assessment Service is a BOM product, which operates from the start of October to the end of March. It provides advance notice of unusually hot conditions allowing government, emergency services and communities time to adopt measures to reduce the impact.

It uses colour coded maps to show the location, or predicted location, of heatwaves over a three day period, while consecutive maps help indicate heatwave conditions persisting for days. There are two sets of maps.

- The Heatwave Assessment consists of a panel of two maps across Australia for the previous two three-day periods (Refer Appendix A)
- The Heatwave Forecast consists of a panel of five maps across Australia for the next five three-day periods.

The colour coding system is described in Table 5.

Heatwave Type	Colour Code	Temperature	Community Impact
No heatwave	White	Normal	Business as usual
Low intensity heatwave	Yellow	Top 10%	Most people have capacity to cope. Increased health risk in vulnerable groups.
Severe heatwave	Orange	Top 2%	Increased deaths and illness in vulnerable groups (> 65, pregnant women, babies and young children, those with chronic illness).
Extreme heatwave	Red	Top 1%	May impact infrastructure. Health risk for anyone who does not take precautions to keep cool, even the healthy.

Table 5: Heatwave colour coding system

The different levels of heatwave (i.e. low intensity, severe and extreme), with an increasing risk profile, enable the generation of tiered arrangements to manage heatwaves with defined activation triggers and escalating response levels. Refer section 4.2.2.

4. SASES RESPONSE ARRANGEMENTS

The response to a heatwave event is based around preparedness and monitoring activities, as heatwaves cannot be prevented. Response and recovery activities are based around potential impacts of heatwaves upon the community and infrastructure.

SASES will provide a response in accordance with its legislative functions and powers, and responsibilities within various plans (e.g. SEMP).

4.1 Prevention activities

Whilst heatwave events cannot be prevented, members of the community can take action to prevent themselves (and their family and pets) from being adversely impacted.

Measures to reduce the impacts include appropriate building design, insulation, air conditioning, fans, garden design, shade areas etc. and the clothing worn or activities being undertaken.

4.2 Preparedness activities

There are a number of preparedness activities that SASES may undertake in the lead up to the summer months commencing from September to prepare for and maintain a state of increased readiness.

These include:

- Initiating awareness campaigns which include providing heat advice to the community and agencies on mitigating actions to reduce impact of potential heat risks
- Notifications to community and updating / validating notification process to key stakeholders
- Conduct training and review of existing plans, procedures and identify available resources
- Encouraging BCP process with agencies/stakeholders
- Review of stores lists to ensure adequate resources of water supply, sunscreen, shade provisions.

4.2.1 Weather monitoring

SASES relies upon information and advice that is provided by the BOM utilising their website and receiving direct briefings by liaising with an embedded meteorologist. A Memorandum of Understanding has been established between the Commonwealth of Australia represented by the Bureau of Meteorology and the SA Country Fire Service outlining the arrangements for BOM to provide briefing and forecasting services to the SACFS, DEW and SASES.

4.2.2 Triggers and SASES actions

Heatwave Information Reports will be provided to SASES by 1400hrs on a daily basis. These will be reviewed by the SASES SDO in consultation with the COS. Table 6 identifies triggers and SASES actions.

Heatwave Type	Warning	Trigger (EHF)	SASES Actions
Low intensity heatwave	Advice	0-1	• Issue a State Heatwave Summary • Consider issuing a Low Intensity Heatwave Advice and / or Community Readiness Alert with Media Conference • Maintain a forward looking approach with regard to longer term heatwave forecasts
Severe heatwave	Watch and Act	>1<3	• SCC partial activation • Issue Severe Heatwave Watch and Act
Extreme heatwave	Emergency Warning	>3	• SCC full activation • Issue Extreme Heatwave Emergency Warning • Media Conference

Table 6: Heatwave Triggers and SASES actions

4.3 Response activities

There are a number of activities that SASES undertakes during the response phase.

4.3.1 State Emergency Centre

The SEC is located in the Adelaide Central Business district.

As the Control Agency, SASES may request activation of the SEC through the State Coordinator (SAPOL). When activated, the SEC will contain representatives of all Supporting Agencies and FSG and will provide a coordinated approach to supporting the Control Agency, provide information to the State Coordinator, and ensure strategic issues are addressed in support of response and recovery operations.

Control Agency responsibilities

As the Control Agency for extreme weather (including heatwaves) SASES has the responsibility to manage the response to the event and advise other stakeholders. Refer to section 2.1.1 of this Plan.

Coordinating Agency

In South Australia, SAPOL is the Coordinating Agency for all emergency incidents. They provide oversight that the Control Agency is fulfilling its responsibilities.

Support Agency

A Support Agency will provide support to the Control Agency and is subject to the direction of the nominated Control Agency.

Functional Support Groups

Section 2.2 identifies the FSGs.

Relevant Plans

Depending upon the impacts of the extreme weather event, secondary plans may be activated.

Examples include:

- Mass Casualty Capability Plan (led by SA Health)
- Displaced Persons Capability Plan (led by Housing SA)

4.3.2 SASES State Control Centre

SASES will manage a Heatwave event by activating the SASES State Control Centre (SCC).

The number of personnel involved in operating the SCC will vary depending on the length of the heatwave event. Decisions as to the structure and number of personnel required and when they are required will lie with the Chief of Staff (COS) in consultation with the State Controller / Deputy State Controller.

The following positions should be considered when rostering the SCC for a heatwave event:

- Chief of Staff
- State Duty Officer
- SCC Planning Officer
- SCC Intelligence Officer
- SCC Logistics Officer
- SCC Public Information Officer
- SCC Media Liaison Officer
- SCC Alerts and Warnings Officer
- SCC Digital Media Officer
- SCC Community Liaison Officer
- SASES SEC Liaison Officer
- SASES Liaison Officer for SACFS (may be required depending on fire danger ratings)

4.3.3 SASES Units

Units will respond to all requests for assistance (RFAs) as they arise. All RFAs must be appropriately assessed and prioritised to ensure any non-urgent tasks be conducted during the early morning or evening where the temperature is cooler, and following consultation with the SASES Regional Duty Officer (RDO), that some jobs may be delayed until the extreme heat temperature subsides. During a day of extreme heat, this can be achieved by undertaking a reconnaissance of the task. Refer to the SASES Working in the Heat Guideline.

Typical incidents during a heatwave event include trees down, animal rescue etc.

Units may also distribute SASES educational material to medical surgeries, pharmacies and local supermarkets.

4.4 Intelligence gathering

Whilst SESIIMS is the designated information management system for receiving agency situation reports, many agencies provide information using Twitter or Facebook, which may be more timely. News services are also quick to report on this information. The Digital Media Officer will maintain a watch across all social media platforms for any information that is relevant to the heatwave event and liaise with the Intelligence Officer and SDO.

The monitoring of impacts from a heatwave event is conducted by many agencies. SASES relies on agencies to provide daily SITREPS detailing relevant impacts.

4.4.1 Impact reporting

SASES will require agencies to report any impacts being felt during heatwave events. The SESIIMS reporting tool will be utilised for this purpose. SASES will advise agencies when SITREPS will be required to be provided.

This will typically be once a Watch and Act has been issued for one or more districts. The emphasis is more impact basis with agencies reporting on either actual or foreseeable impacts on them**.** In providing their report responses, agencies should indicate whether they are state-wide or for an impacted area only.

All stakeholders have access to SESIIMS and can log in as an Extreme Heat Reporter. Refer SESIIMS Major Events Guide for further information. In the Extreme Heat Management Board, stakeholders are able to submit a SITREP providing the following information:

- Business impact
- Measured operational activity
- Media release / briefs issued
- Scaled warning issued
- Emerging issues / significant events
- Additional comments

This information is collated and summarised into the SASES State SITREP which is then distributed to relevant stakeholders.

Human Welfare

Impacts upon human welfare are monitored by SAAS, SA Health, Housing SA and Department for Human Services.

Animal Welfare

Impacts upon animal welfare are monitored by PIRSA and RSPCA.

Infrastructure

Impacts to transportation (i.e. road, rail, public transport) and electricity are reported by relevant agencies and organisations. In the event of infrastructure failure, the impact upon response agencies (e.g. DPTI, SAPOL, SAPN) may increase.

Dry electrical storms

During heatwave conditions, localised severe weather impacts may occur, from whirlwinds / 'dust devils' and dry electrical storms producing lightning. This increases the risk for bushfires.

Bushfires

Bushfires may occur during periods of extreme heat. SASES provides support to SACFS during bushfire activations through a SASES Liaison Officer in the SACFS SCC as well as other activities including but not limited to management of Staging Areas and Base Camps (as required) or providing ground support.

4.5 Relief

Relief from a heatwave is gained by people seeking cool air conditioned environments (e.g. own home, shopping centres, public buildings) or around cool water (e.g. fountains, dams, creeks, rivers, coastal beaches and public swimming pools).

4.5.1 Public spaces

Members of the public may seek cooler environments at places such as theatres, shopping centres, swimming centres, beaches, and lakes.

4.5.2 Government buildings

Lobbies and foyers may be used by the public to gain temporary respite or relief from the heat during business hours. DPC may authorise and issue a government-wide email identifying which Government buildings will be made available.

4.6 Recovery

The State Recovery Office (SRO) works in partnership with Commonwealth, State and Local Government agencies, non-government bodies and communities to ensure the State's disaster recovery plans, arrangements and capacity are ready to operate in a disaster.

It is important that organisations keep accurate records regarding their financial costs and expenditure specifically related to the event for cost recovery purposes and supply these to the SRO.

4.7 Stand down

Stand down will be declared by the COS, after consulting with all relevant stakeholders when it is considered that the response activities of the incident have been effectively completed. This is usually associated with the issuing of a Cancellation of the Emergency Warning.

4.8 Debrief arrangements

The SASES will coordinate debriefing of the heatwave event in accordance with the debriefing guidelines in the SEMP.

All agencies involved in the heatwave event should be included in the debrief.

5. PUBLIC INFORMATION

The SASES, as Control Agency for heatwaves, is responsible for the delivery of heatwave warnings and messaging for the South Australian community.

5.1 Key messages

The following are key heatwave messages endorsed by SASES.

- Keep cool
- Stay hydrated
- Check on those at risk

Additional messaging information can be found in the SASES Key Messages Guideline within the Public Information Manual.

5.2 Specific issues for coverage

There may be keys issues that arise from heatwave conditions that may lead to incorrect perceptions or assumptions, and generate public discussion which may need to be addressed.

5.2.1 SASES volunteer and staff safety

When responding to requests for assistance, the health and safety of volunteers and staff is of first priority. General requirements are identified in the SASES Work Health and Safety Manual. Safety reminders are issued through event specific SITREPS and the operations order (OPORD).

5.2.2 Community safety

The main community (or individual) health risks in heatwave include heat-related illness, such as dehydration, heat cramps, heat syncope(i.e. dizziness and fainting), heat exhaustion and heat stroke.

Other risks may include:

- Drowning due to more people seeking respite in water (e.g. fountains, pools, dams, oceans, rivers) and the increase in overseas tourists
- Crush injuries or death, damage to structures and vehicles as a result of falling tree branches of heat stressed trees
- Heat related illnesses to outdoor workers (construction, primary industry and road workers) exposed to direct sunlight whilst carrying out strenuous tasks or working for sustained long periods during the hottest parts of the day
- Greater exposure to heat for workers in warehouses, hospitality and manufacturing with limited or no cooling opportunities
- Heat related illnesses to persons undertaking sports and exercises during the hottest parts of the day
- Comorbidity – the effects of heat may be amplified on people with pre-existing medical conditions and those taking certain medications

5.2.3 Electricity outages

Where an electrical power failure (or power outage) occurs due to heatwave conditions (e.g. tree down, infrastructure failure, interconnector issues) SASES must not make any public comments, though media outlets will ask questions of the SASES media representatives or interviewees.

Public comment should be left to the Premier, Energy Minister or the Department of Energy and Mining.

5.2.4 Hospital presentations / deaths

Information in relation to hospital presentations and deaths are managed by SA Health (and SAAS) and SAPOL.

5.3 Alerts and Warnings

Guidelines for the distribution of community information and warnings are contained in Part 3, Annex C of the SEMP.

SASES has developed a suite of scaled warning templates which seek to communicate core safety messaging whilst also addressing a number of factors unique to these events. These factors are:

- Heatwave events are prolonged
- The impacts of heatwaves change or develop over the duration of an event
- In a heatwave the members of the community who will be significantly impacted, and the level of impact is different depending on the intensity of the event
- The threat from heatwave is invisible and is not well understood by the public
- The threat from heatwave is often trivialised, or key messaging undermined, by the way it is communicated by media in order to make it 'newsworthy'.

SASES will issue alerts and warnings via the SASES SCC. If the SEC is activated, information and warnings may be monitored by the Public Information FSG.

5.3.1 SES Community Readiness Alert

The primary purpose of an SES Community Readiness Alert is to prepare the community in advance of a significant heatwave event. The Alert will be:

- Issued a few days in advance of a significant heatwave event
- Accompanied by a media conference

5.3.2 Low-Intensity Heatwave Advice

The Low-intensity Heatwave Advice is issued only for one day and only for each area in which the following day is forecast Severe or Extreme Heatwave with a focus on preparedness and vulnerable communities.

- Issued on a day of low-intensity heatwave
- Only used if next day is forecast severe/extreme

5.3.3 Severe Heatwave Watch and Act

A Severe Heatwave Watch and Act is issued for each area where a Severe Heatwave is forecast with a focus on key messages but phrased differently each day to engage the audience.

- Issued on days of severe heatwave
- 4 different templates
- Later templates reflect escalating risks

5.3.4 Extreme Heatwave Emergency Warning

An Extreme Heatwave Emergency Warning is issued for each area where an Extreme Heatwave is forecast with a focus still on key messages but phrased differently each day to emphasise that everyone is at risk..

- Issued on a day of extreme heatwave
- 3 different templates
- Greater focus on infrastructure impact

5.3.5 Heatwave Advice Reduced Threat

A Heatwave Advice Reduced Threat Alert is issued at the end of an event with a focus on ongoing risks and recovery.

5.4 Community Engagement

The Community Engagement Unit may initiate various activities to raise community awareness of the impacts of heatwave conditions to those at risk. This may occur as part of the preparedness phase or during the actual heatwave.

These may include:

- Providing heat advice to the community, agencies and at risk communities on mitigating actions to reduce impact of potential heat risks
- Notifications to community and key stakeholders
- Initiating awareness campaigns

5.4.1 State Government

A government-wide email, initiated by the SASES Chief of Staff (authorised by SASES State Controller / SAFECOM Chief Officer) is sent via DPC to all government employee emails in relation to preparatory measures that government departments and personnel should take during the heatwave period.

5.4.2 Community events

Many community events are hosted during summer, which may be impacted by heatwave conditions. Some community events may be cancelled, but other larger events or elite sporting events may continue under modified conditions, or additional control measures are implemented to reduce the risk to staff and patrons.

SASES may consider distributing educational brochures and posters at the entry points to venues. The use of public address systems and video boards/screens may be useful to promote heatwave safety measures.

Major events are coordinated by the Emergency Services Major Events Coordination Committee (ESMECC)

Refer to the Public Information Manual for specific community events websites.

5.4.3 Variable messaging boards

A variable messaging board is an electronic traffic sign that is often used on roadways to provide drivers important information.

SASES can utilise these to communicate specific messaging during heatwave events. Examples include ETSA building and Adelaide Oval during sporting events.

Variable Messaging Boards can also be accessed through certain councils or alternatively may be hired.

5.5 Media

The Media Unit will be responsible for managing all interactions with the media. The Media Unit is also responsible for preparing media releases and advising media of details of (a) media conferences or (b) specific response activities.

5.5.1 Media conference

A media conference may be arranged on the day before, or on, the first day of the Emergency Heat Warning involving representatives from:

- SASES (e.g. Chief Officer, Deputy Chief Officer, COS or SDO)
- Bureau of Meteorology
- SA Health and/or SAAS
- Others may include SAPN, Surf Life Saving

Locations may include the SASES SHQ, BOM Office, Adelaide Airport, location where events may be taking place (e.g. Tour Down Under, coastal area such as Surf Life Saving Club).

5.5.2 Interpreters

The use of Australian Sign Language (AUSLAN) interpreters and / or language interpreters must be considered by Control Agencies when disseminating messages to the community.

In the event of a declared emergency, all live televised warnings, or major public information press conferences must be supported with the use of an accredited AUSLAN interpreter.

5.5.3 National television programs

The national television programs Sunrise (7) and Today (9) often request live-to-air interviews involving a camera person outside of 60 Waymouth Street with broadcast times between 0600 and 0730hrs each morning, with pre-arranged questions. These are typically organised during the afternoon of the day before the morning the interviews are required.

A talking head needs to be organised and pre-prepared speaker notes need to be prepared for the pre-arranged questions. The interviews are usually performed by the Chief Officer, Deputy Chief Officer, COS or SDO.

5.5.4 Local News Service

Some pre-recorded television or live radio interviews pre-arrange the previous day, and some with five minutes notice may include:

- Radio – ABC Local Radio, 5AA, Mix FM
- Television – ABC, 7, 9 and 10
- Print Media – The Advertiser
- Digital Media – AdelaideNow

5.5.5 Event specific digital banners

Digital banners on SASES website and sa.gov.au website links to heatwave information. These are located at:

- SASES website

https://www.ses.sa.gov.au/site/heat.jsp

- sa.gov.au website

https://www.sa.gov.au/topics/emergencies-and-safety/types/heatwave

5.5.6 Digital Media

SASES manages official Facebook and Twitter pages located at:

- SASES Twitter: https://twitter.com/SA_SES
- SASES Facebook: @SAStateEmergencyService

APPENDIX A – HEATWAVE ASSESSMENTS AND FORECAST REPORTS

SOUTH AUSTRALIA PILOT HEATWAVE ASSESSMENTS AND FORECAST REPORT

EXPLANATORY NOTES

District Summary

The District Summary table currently provides information on each district under low, severe or extreme heatwave conditions. It is important to note that:

- the table provides information on the heatwave classifications for districts. The classification applies to **three day periods.** Periods analysed cover a three day block concluding on the day the report is issued, through to a three day block four days forecast ahead. This table is colour coded indicating heatwave classification
- a district must have at least **10% of its area** under heatwave conditions to trigger a heatwave classification at the respective level with the most intense classification indicated (eg, if a district has 55% of its area in Low Intensity and 25% in Severe Intensity then it will be recorded as in severe for the whole district within the District Summary table).
    - Yellow = Low Intensity (ie, excess heat factor severity (EHF_{sev}) greater than zero but less than one)
    - Orange = Severe Intensity (ie EHF_{sev} between one and three)
    - Red = Extreme Intensity (ie, EHF_{sev} greater than three)

District	Sat-Today, 2019-01-14	Sun-Tue, 2019-01-1	Today-Wed, 2019-01-	Tue-Thu, 2019-01-1	Wed-Fri, 2019-01-1	Thu-Sat, 2019-01-19	Fri-Sun, 2019-01-20
Adelaide Metropolitan		Low intensity	Severe	Severe	Low intensity		
Mount Lofty Ranges		Low intensity	Severe	Severe	Low intensity		
Yorke Peninsula		Low intensity	Severe	Severe	Low intensity		
Kangaroo Island		Low intensity	Low intensity	Low intensity	Low intensity		
Upper South East		Low intensity	Severe	Severe	Low intensity		
Lower South East		Low intensity	Severe	Severe	Low intensity		
Riverland	Low intensity	Low intensity	Severe	Severe	Low intensity		
Murraylands	Low intensity	Low intensity	Severe	Severe	Low intensity		
Mid North	Low intensity	Low intensity	Severe	Severe	Low intensity		
Flinders	Low intensity	Severe	Severe	Severe	Low intensity		
West Coast		Low intensity	Severe	Severe	Low intensity		
Eastern Eyre Peninsula		Low intensity	Severe	Severe	Low intensity		
Lower Eyre Peninsula		Low intensity	Severe	Severe	Low intensity		
North West Pastoral	Severe	Extreme	Extreme	Severe	Low intensity		
North East Pastoral	Severe	Severe	Severe	Severe	Severe	Low intensity	Low intensity

Towns

When looking at the Towns table, the figures provide **EHF_{sev} data for the townships** listed. Each classification is for the **three day periods** as detailed in column headers.

Blank data means EHF_{sev} is zero or less. The figures provide an assessment for the previous two days, forecasts for the current and the next four days.

Note that there are 59 townships listed which are grouped by weather district with Greater Metropolitan Adelaide broken into four areas, nominally named Elizabeth, Adelaide, Glenelg and Noarlunga.

Districts Table

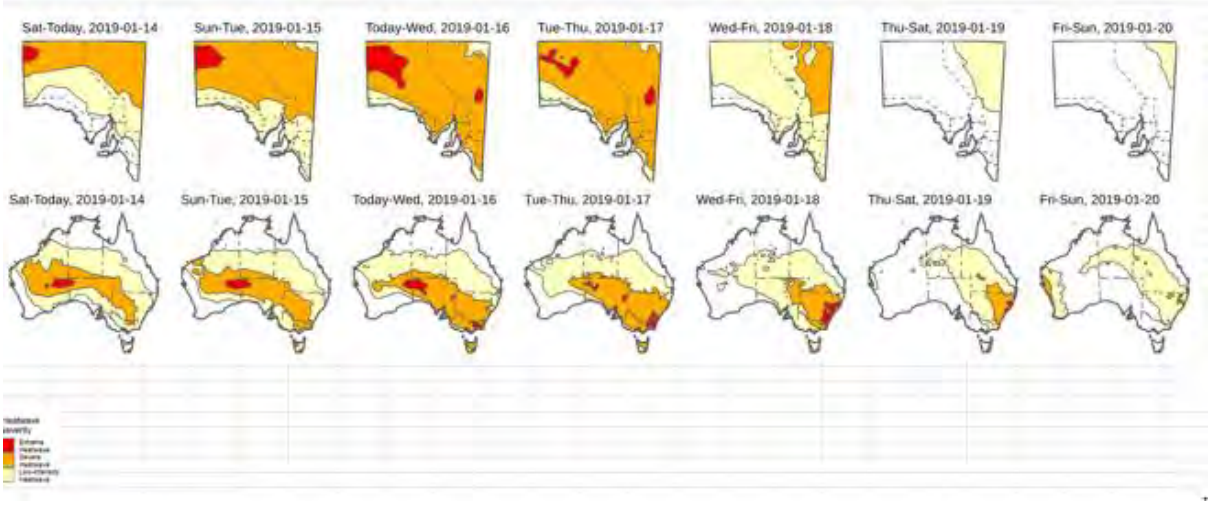
This table provides data on the percentage of each district that is subject to different heatwave classifications. Each classification is for the **three day periods** as detailed in column headers.

The districts are listed three times in this table, corresponding to the three classification levels for heatwave and the percentage of that district that is covered by the respective classification level.

Maps

The maps product provides a graphical depiction of the categories of EHF_{sev} assessments and forecasts with both state and national perspectives. The assessments are for three day periods as detailed in graphic titles.

The assessments cover **3-day periods** commencing two days earlier to the report's publication through to a three day period forecast four days ahead of the day of the report is issued.



Detailed SA Maps

The SA maps provide a graduated depiction of EHF_{sev} assessments and forecasts (uncategorised but colour coded to reflect the intensity range within classifications) with both state and national perspectives. The assessments cover **3-day periods** commencing two days earlier to the report's publication through to a three day period forecast four days ahead of the day of the report is issued.

EHF severity (EHFsev)

The **Excess Heat Factor** (EHF) is calculated based on average daily temperatures over **three consecutive days**. This is measured in relation to the local long-term climate (by comparing the three days to a climatological threshold for that particular location) and to the local recent past (by comparing the three days to observed temperatures over the previous thirty days at that particular location).

- The raw EHF values are scaled to severity quantities, called EHF_{sev}. These quantities are based on reproducible and objective statistics founded on the Pareto principle which holds that most impact is felt in conditions that are outside the normal range.
- The calculation takes into account people's ability to adapt to the heat, both in the long and shorter term. For example, the same high temperature will be felt differently by residents in Coober Pedy compared to those in Mount Gambier, who are not used to the higher range of temperatures experienced in the north of the state. On the other hand, in any one location, temperatures that meet the criteria for a heatwave at the end of summer will generally be hotter than the temperatures that meet the criteria for the same intensity heatwave at the beginning of summer.
- A **heatwave day** is defined as any day for which EHF_{sev} is positive (greater than zero). It is the ***first*** day of a three day period with unusually high temperatures. A **heatwave event** is defined as one or more consecutive heatwave days.
- Heatwaves are further classified into three levels (low severity, severe, extreme), based on EHF values exceeding EHF_{sev} thresholds within an event.

  Low-Intensity Heatwave

  - Lower positive EHF_{sev} values ($EHF_{sev} > 0$ and $EHF_{sev} < 1$) – ie, greater than zero but less than one
  - Most common
  - Most people can cope

  Severe Heatwave

  - Higher EHF_{sev} values ($EHF_{sev} >= 1$ and $EHF_{sev} < 3$) – ie, between one and three
  - Less frequent
  - Can impact vulnerable people

  Extreme Heatwave

  - Highest EHF_{sev} values ($EHF_{sev} >= 3$) – ie, greater than three
  - *Rarest*
  - Capable of causing widespread health issues
  - Can impact infrastructure such as power and transport

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APPENDIX B – DISTRICT TABLE REPORT

Example of the SA Towns Table for 08-01-2019

2019-01-	2019-01-07	ID	District	Town	Tod	2019-01-09	2019-01-10	2019-01-11	2019-01-12
		1	North West Pastoral	Pukatja / Ernabella			0.1	0.6	0.6
		2	North West Pastoral	Marla				0.2	0.3
		3	North West Pastoral	Coober Pedy			0.1	0.8	1.1
		4	North West Pastoral	Oak Valley			0	0.1	0.4
		5	North West Pastoral	Roxby Downs			0.2	0.9	1.5
		6	North West Pastoral	Tarcoola			0	0.4	0.7
		7	North West Pastoral	Woomera			0.1	0.7	1
		8	North East Pastoral	Oodnadatta			0.1	0.8	0.9
		9	North East Pastoral	Moomba		0.1	0.5	1.1	1.3
		10	North East Pastoral	Marree			0.4	1.1	1.6
		11	North East Pastoral	Leigh Creek		0	0.4	1.2	1.6
		12	North East Pastoral	Yunta			0	0.8	1.3
		13	West Coast	Nullabor					
		14	West Coast	Ceduna					
		15	West Coast	Wudinna				0.1	0.2
		16	West Coast	Elliston					
		17	Eastern Eyre Peninsula	Whyalla				0	0
		18	Eastern Eyre Peninsula	Kimba				0.3	0.4
		19	Eastern Eyre Peninsula	Cleve					
		20	Lower Eyre Peninsula	Cummins				0	0
		21	Lower Eyre Peninsula	Coffin Bay					
		22	Lower Eyre Peninsula	Port Lincoln					
		23	Flinders	Hawker			0.4	1.3	1.4
		24	Flinders	Port Augusta			0	0.6	0.7
		25	Flinders	Orroroo			0.3	1.4	1.7
		26	Mid North	Port Pirie			0	0.3	0.3
		27	Mid North	Jamestown			0.2	1.1	1.3
		28	Mid North	Snowtown				0.1	0.2
		29	Mid North	Clare			0	0.6	0.7
		30	Mid North	Roseworthy				0.2	0.3
		31	Mount Lofty Ranges	Nuriootpa				0.3	0.4
		32	Mount Lofty Ranges	Stirling				0.1	0.1
		33	Mount Lofty Ranges	Mount Barker				0	0
		34	Mount Lofty Ranges	Strathalbyn					
		35	Mount Lofty Ranges	Victor Harbor					
		36	Mount Lofty Ranges	Parawa					
		37	Adelaide Metropolitan	Elizabeth				0.2	0.1
		38	Adelaide Metropolitan	Adelaide				0.1	0
		39	Adelaide Metropolitan	Glenelg				0.1	0.1
		40	Adelaide Metropolitan	Noarlunga				0	0
		41	York Peninsula	Kadina				0	
		42	York Peninsula	Maitland					
		43	York Peninsula	Minlaton					
		44	York Peninsula	Edithburgh					
		45	York Peninsula	Stenhouse Bay					
		46	Kangaroo Island	Kingscote					
		47	Kangaroo Island	Parndana					
		48	Riverland	Waikerie				0.4	0.6
		49	Riverland	Renmark			0.1	0.8	1.1
		50	Murraylands	Murray Bridge				0.1	0
		51	Murraylands	Karoonda				0.3	0.4
		52	Murraylands	Lameroo				0.2	0.4
		53	Upper South East	Meningie					
		54	Upper South East	Keith				0	0
		55	Upper South East	Bordertown				0	0
		56	Lower South East	Robe					
		57	Lower South East	Naracoorte					0
		58	Lower South East	Coonawarra					
		59	Lower South East	Mount Gambier					

Government of South Australia

SES RESCUE

A reliable and trusted volunteer based organisation building safe and resilient communities.

SASES Land Development Policy
Extreme Weather and Floods

The Policy of the South Australian State Emergency Service provides guidance, in respect to extreme weather and floods, for organisations that have responsibilities for land use planning and building design and construction.

September 2018

Document Control Sheet

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TABLE OF CONTENTS

INTRODUCTION

This document describes the South Australian State Emergency Service's (SASES) policy positions on land use planning and building design and construction to mitigate the risk of extreme weather and flood events to community health and safety, homes, businesses and the State's infrastructure. It provides the context and rationale for each policy statement with links to relevant legislation, regulations and other guiding documents.

SASES is responsible for providing leadership in a coordinated and consistent manner to plan for, respond to and recover from hazards associated with extreme weather. Although SASES does not have direct responsibilities for land use planning, building or development, they are identified as a government agency to be consulted on development plan amendments (DPAs) and have a role in providing advice in relation to hazard management during reviews of State planning policy and strategy

The policies describe what is considered best practice by SASES with regard to the mitigation of risks associated with extreme weather through appropriate land use planning and building controls.

It is acknowledged that a minimum requirement for the design, construction and performance of buildings throughout Australia is set by the National Construction Code.

THE ROLE OF SASES IN EMERGENCY MANAGEMENT

The South Australian SASES is identified in the *State Emergency Management Plan* as the:

- Hazard leader for extreme weather;
- Control agency for extreme weather; and
- Control agency for flood.

SASES has a leadership role for the planning of emergency management activities which may include providing input to land use planning and provision of public information. Given these responsibilities, SASES aims to increase community awareness and preparedness through a number of programs including providing advice relating to policies it has adopted.

Consistent with emergency management across Australia, SASES undertakes a range of actions and programs to prevent, prepare for, respond to and recover (PPRR) from hazards.

BACKGROUND

Extreme Weather and Flood Hazards

A hazard is anything that has the potential to cause damage or harm. Extreme weather hazards include heatwaves, storms and severe winds. Flood hazards include riverine, flash flood, sea inundation and dam burst events.

Extreme weather and heatwaves have the potential to impact the health and wellbeing of the community, infrastructure and essential services and local and regional economies. Recent extreme weather events have seen disruptions to essential services, loss of agricultural crops and damage to buildings and infrastructure resulting in high costs of repair and recovery.

More Australians die from extreme heat than from any other type of natural disaster [(1)] . The effect of heat on the community, infrastructure and services is cumulative [(2)]. A single day of high temperature can have an impact and this impact escalates with successive days of high temperatures.

In addition to the immediate and direct impacts that may include reduced health and wellbeing, loss of life, damage or destruction of homes, businesses, infrastructure or valued natural environments, indirect impacts resulting from damaged electricity infrastructure or roads can be felt for some time after the event has passed.

Climate Change

The South Australian climate is naturally variable, with extremes in temperatures and rainfall occurring regularly during the recorded weather history. In recent years, the frequency and duration of heatwaves has increased, and the hottest days recorded have become even hotter.

Modelling and research indicates changing climatic conditions are and will continue to increase in their frequency and intensity. Substantial increases in the frequency of hot days, maximum temperatures and the duration of heatwaves are projected with very high confidence across all of South Australia. Although average annual rainfall is projected to decline, there is high confidence that heavy rainfall intensity is projected to increase across all of South Australia [(3)].

The need for greater community resilience and making our buildings, infrastructure and public realm more resilient to extreme weather will become increasingly important as climate change results in more frequent and intense extreme weather events.

Risk Management

Land use planning allows planning authorities to strategically consider potential hazards when planning for land use and development, and to set policy on acceptable risk and controls that increase the ability of individuals and the community to be prepared for and recover from a hazard event.

Mitigating risk from natural hazards is not about totally avoiding or eliminating the risk. Natural hazards are a feature of our environment and, in most instances, the potential impacts of natural hazards can be managed but not eliminated. Individuals, developers, communities and governments must balance the costs associated with managing the impacts of natural hazards against the benefits arising from development. In some cases, the costs (including the costs of mitigation) may outweigh the benefits and the government or a community may determine that it is prudent to avoid development in a particular area for that reason.

National Approach to Disaster Resilience

This policy document has been prepared with reference to the National Strategy for Disaster Resilience (NSDR)[(4)] Reducing risks in the built environment is a key strategy to build resilience, and the NSDR identifies that responsible land use planning can reduce or prevent the likelihood of hazards impacting communities.

THE PLANNING SYSTEM IN SOUTH AUSTRALIA

The planning system in South Australia is in the process of significant reform which commenced with the introduction of new legislation and other components of the proposed new system are currently being developed and consulted upon. The intended result is that South Australia will have an integrated planning and development system, with four distinct but interrelated parts; legislation, State Planning Policies, Regional Plans and the Planning and Design Code.

- *The Planning Development and Infrastructure Act 2016* (the Act) and *Regulations* provide an overarching framework for South Australia's planning and development system. It provides for matters relating to the use, development and management of land and buildings, including providing a planning system to regulate development within the State, rules with respect to the design, construction and use of buildings, and other initiatives to facilitate the development of infrastructure, facilities and environments that will benefit the community
- The State Planning Policies set out the overarching goals for the state and requirements for the planning system
- Regional Plans provide the long term vision for regions or areas about the integration of land use, transport, infrastructure and public realm
- The Planning and Design Code sets out the policies, rules and classifications for the purpose of development assessment and related matters for the state, it includes Design Standards, Practice Guidelines and Practice Directions.

Development plans

Development plans are being transitioned into a new Planning and Design Code, but for the interim, are key on-the-ground development assessment documents in South Australia. They contain the guidelines that set out what can be done on any piece of land across the State, and the detailed criteria against which development applications will be assessed. Development plans cover distinct and separate geographic areas of the state. Development plans outline what sort of developments and land use are and are not envisaged for particular zones (e.g. residential, commercial, industrial), and various objectives, principles and policies further controlling and affecting the design and other aspects of proposed developments. Policies may include direction for development in areas subject to natural hazard risk. These policies typically cover flooding, bushfire, salinity, acid sulphate soils and landslip. Changes to Development plans are undertaken through a formal development plan amendment (DPA) process.

All acts or activities defined as development require the lodgement of a development application to seek development approval. Each application is assessed with regard to its conformity and consistency with the relevant development plan. The relevant authority for each application varies depending on the nature of the development and the authority may be required to refer the application to other agencies and SASES is sometimes requested to comment informally on development applications.

POLICY PRINCIPLES

SASES advocates the creation of safer, sustainable communities through:

1. The development and regular review of hazard information relating to heatwaves, wind, storms, flood and dam burst, including:
    a. Ensuring flood hazard modelling and mapping outputs identify areas at risk from flood events including riverine flooding, sea level rise and dam burst,
    b. Consideration of local factors that influence wind hazard, and
    c. Consideration of heat island mapping (if available) and prevailing winds.
2. The sharing of hazard risk information with relevant authorities and the wider community, including engagement with communities, businesses and industries to increase awareness and understanding of risks and how to prepare for, respond to and recover from events
3. Using hazard data to inform the development of planning policy and regulations including development plans.
4. Ensuring all proposed developments or land uses are subject to an assessment of the level of risk to life, safety, health and property from extreme weather and flood events.
5. Ensuring the design, construction and location of critical infrastructure will minimise disruption (to people and the economy) during and after extreme weather and flood events.
6. Promoting the construction of buildings that where practicable exceed requirements of Federal, State and local government legislations, standards and guidelines, particularly with regard to access and egress, structural provisions relating to expected hazards and energy efficiency. This could be through the use if the international recognised Green Star sustainability rating system,

SOUTH AUSTRALIAN SASES POLICY STATEMENTS

Notwithstanding any requirements of the *Emergency Management Act 2004*, *Planning Development and Infrastructure Act 2016*, *Natural Resources Management Act 2004* or *National Construction Code 2016*, the following policies describe the position of SASES relating to land use planning and building design and construction.

1. An 'all hazards' approach should be applied to decisions relating to land use planning and the design and construction of buildings and infrastructure.
2. All levels of decision making in land use planning and building control should be responsible for considering the potential impact of extreme weather events.
3. The impact of future climate conditions on the increasing frequency and intensity of extreme weather events should be considered in decisions relating to land use planning and building design and construction.
4. Development should not increase the risk of flooding on adjoining areas.
5. Development should not increase the risk of landslip.
6. Development should not rely on flood levees or flood control dams for protection from flood inundation.
7. New dam approval should require applicants to consider the potential consequences of dam failure.
8. Hazardous materials should be stored and located to minimise the risk of escape during extreme weather or flood events.
9. Road provision should provide adequate access/egress during an extreme weather or flood event. Proposed development should not impede or block access/egress routes of existing developments.
10. Buildings, streetscapes and neighbourhoods should be designed to enable safe evacuation.
11. Building and infrastructure design and construction should be structurally adequate to withstand expected depth and velocity of flood flow, maximum probable wind speeds, hail loading and extreme heat.
12. Residential buildings should be designed and constructed to minimise heat and cold stress and provide year-round thermal comfort while reducing reliance on artificial heating and cooling.
13. Buildings, infrastructure, streetscapes and neighbourhoods should be designed to mitigate the impacts of extreme heat, including through the installation of green infrastructure.

Each of these policies is consistent with SASES' mission to *minimise the loss of life, injuries and damage from emergencies and natural disasters*. They are consistent with SASES' role in preventing extreme weather and flood events adversely impacting on community health and safety, homes, businesses and the State's infrastructure.

SASES Policy Statement #1

An 'all hazards' approach should be applied to decisions relating to land use planning and the design and construction of buildings and infrastructure

Context

Australia has adopted a comprehensive and integrated approach to emergency management; comprehensive in encompassing 'all hazards' and integrated across all levels of government, agencies and the community[(8)]. Consistent with this, the South Australian State Emergency Management Plan (SEMP) has been based upon the 'all hazards' principles endorsed by the South Australian Emergency Management Council and Emergency Management Australia.

In any particular area there are a number of hazards that may occur. The 'all hazards' approach does not require planning for every possible hazard that may occur but requires consideration of the hazards that are more likely to affect people, assets, infrastructure and the environment.

Planning safer and more resilient communities requires consideration of potential hazards when making decisions relating to land use planning strategy and policy, as well as when designing and constructing buildings and infrastructure.

Roles and responsibilities

Decision making in land use planning and building occurs from a State and national level relating to the Building Code and State legislation, through to the decision of individual land owners to undertake development.

The State Emergency Management Plan (SEMP) identifies hazard leaders to take a leadership role in emergency management activities related to its appointed hazard. Each hazard leader is required to prepare a State level hazard plan based on the principles of the SEMP but with an emphasis on the particular hazard. This suggests each hazard plan should consider interactions with other hazards, consistent with an 'all hazards' approach however this is not always considered.

Within the Hazards section of the SA Planning Policy Library, principles of development control for some individual hazards are described however there is no reference to an 'all hazards' approach.

The *National Construction Code (NCC)* describes construction requirements for buildings. Volume One and Volume Two of the NCC comprise the Building Code of Australia (BCA) and Volume Three is the Plumbing Code of Australia. All three volumes contain performance requirements linked to hazard management. Satisfaction of all requirements does constitute to some extent an 'all hazards' approach, as requirements relate to construction in bushfire prone areas, flood hazard areas, energy efficiency, access and egress. Structural provisions of the BCA require a building or structure to perform adequately even under (reasonably expected) conditions including hazards such as wind, earthquake, rainwater and thermal effects.

Rationale

The application of an 'all hazards' approach is consistent with the national approach identified by Emergency Management Australia and the SEMP.

Where development is proposed, it is imperative that 'all hazards' are considered at the planning and design stage, including consideration of future hazards conditions. Consideration of hazards and associated risks is required to prevent the construction of buildings and infrastructure that continue to function under expected conditions, and do not cause harm to people, assets, infrastructure and the environment. In most cases it is more efficient and effective to consider hazards during the planning stage rather than attempt to retrofit mitigation or management features later.

Application

In the role of hazard leader, SASES may be sought to provide informal comment on development plan amendments or development applications. SASES should review the need for and where appropriate advocate the application of an ‘all hazards’ approach, with an emphasis on the extreme weather hazard for which SASES is hazard leader. This may mean requesting confirmation that all hazards have been considered, not just those for which SASES is hazard leader.

Any documents prepared by SASES should advocate an ‘all hazards’ approach and consider the interactions of extreme weather with other hazards.

SASES should advocate this policy through the development plan amendments process and the proposed Planning and Design Code.

SASES Policy Statement #2

All levels of decision making in land use planning and building control should be responsible for considering the potential impact of extreme weather events

Context

Australia has adopted a comprehensive and integrated approach to emergency management - comprehensive in encompassing all hazards and integrated across all levels of government, agencies and the community[(8)]. The National Strategy for Disaster Resilience recognises the significant role of government at all levels to develop and implement risk-based land management and planning arrangements [(4)]. Land use planning can prevent or reduce the likelihood of hazards impacting communities by reducing the number of people or assets in known high risk areas.

In South Australia the planning and development system is made up of three parts with different levels of government responsible. The legislative framework is provided by the *Planning Development and Infrastructure Act 2016 and Regulations*. Currently, the South Australian Planning Policy Library (SAPPL) guides the preparation of development plans by Councils and contains a number of policies relating to natural hazards. Although flooding is referenced in many of the current policies, there are no specific policies directly referencing extreme storm or extreme heat.

The *Guide to Best Practice Flood Risk Management in Australia*[(9)] notes that individuals within the community need to recognise that they are responsible for informing themselves about flood risks and the need, availability and coverage of flood insurance; being aware of how to respond to a flood threat in consideration of community response plans; and heeding the advice of relevant government and emergency management personnel during flood events. This recognition also applies to other hazards and empowering individuals to be self-reliant and to take responsibility for the risks in their community is identified in the National Strategy for Disaster Resilience. For individuals to make effective judgements about the risks they face, risk information must made available in a manner that can be easily understood and this is the role of local and State government.

Roles and responsibilities

Decision making in land use planning and building occurs from a State and national level relating to the Building Code and State legislation, through to the decision of individual land owners to undertake development.

The State Emergency Management Plan (SEMP) identifies hazard leaders to take a leadership role in emergency management activities related to its appointed hazard and to lead a multi-agency approach to planning for the identified hazard.

The South Australian planning system identifies current responsibilities for local and State government relating to the development of planning policy and assessment of proposed development. Planning reform commenced with the introduction of the *Planning, Development and Infrastructure Act* 2016 will see the development of the *Planning and Design Code* that will document the rules against which development is assessed, and the *Design Standards* for public realm and infrastructure.

At an individual building scale, the Building Code of Australia provides performance requirements linked to hazard management and it is the responsibility of builders to ensure compliance. Home or property owners also have responsibilities to inform themselves about the hazards that may impact their assets and adopt appropriate risk mitigation.

Rationale

The application of an integrated approach to land use planning is consistent with the national approach identified by Emergency Management Australia and the SEMP. Responsibilities for land use planning and building decision making exist at all levels from governments to individual land owners. Recognition of the range of responsibilities is required to ensure extreme weather is appropriately considered.

Application

In the role of hazard leader, SASES may be sought to provide informal comment on development plan amendments (DPA) or development applications (DAs). Where relevant, the SASES may seek confirmation that all levels of government have been consulted on the DPA or DA.

The SASES should support all decision makers through the provision of readily accessible information regarding the potential impacts of extreme weather across the State, to enable the best available information to inform land use planning and building design and construction.

The SASES should advocate this policy through the development plan amendments process and the proposed Planning and Design Code.

SASES Policy Statement #3

The impact of future climate conditions on the increasing frequency and intensity of extreme weather events should be considered in decisions relating to land use planning and building design and construction

Context

Extreme weather and heatwaves have always occurred in South Australia but changing climatic conditions are increasing the intensity and frequency of many extreme weather events. In the last 50 years, the duration, frequency and intensity of heatwaves has been increasing and record breaking heatwaves have occurred in recent years.

Modelling and research indicates changing climatic conditions are and will continue to increase their frequency and intensity. Substantial increases in the frequency of hot days, maximum temperatures and the duration of heatwaves are projected with very high confidence across all of South Australia. Although average annual rainfall is projected to decline, there is high confidence that heavy rainfall intensity is projected to increase across all of South Australia[3].

Making South Australian communities more resilient to extreme weather will become increasingly important as climate change results in more frequent and intense extreme weather events. The Climate Council compared recent heatwaves with heatwaves prior to 1980, and found that heatwaves in the state are becoming longer and more intense, with an average of 4 days increased length, 2.5 degrees increase in average heat intensity, and 4.3 degrees increase in peak heat intensity[23]. Increasing intensity of storms is also extremely likely due to the impacts of climate change[10]

Higher intensity extreme weather events will increase impacts to the community, and hence there will be a need for greater capacity for response and recovery from extreme weather events.

Regional climate change adaptation plans across the state have identified the need for 'climate ready' buildings and places (e.g. Resilient East, Adapt West). These climate ready buildings and places will need to be designed considering the potential for extreme weather events to become more frequent and intense. The need for greater community understanding and resilience will become more significant when climate change impacts are considered.

Decisions about land use planning, assets and infrastructure need to consider how long the effect of each decision will be felt. For example transport infrastructure may be designed to last for 40 to 50 years and hence the likelihood of hazards causing harm or loss must be considered for at least 50 years into the future. This then requires the consideration of how hazards may change in the future, in particular as a result of climate change.

Roles and responsibilities

Decision making in land use planning and building design and construction occurs from a State and national level relating to the Building Code and State legislation, through to the decision of individual land owners to undertake development.

The South Australian planning system identifies current responsibilities for local and State government relating to the development of planning policy and assessment of proposed development. Planning reform commenced with the introduction of the *Planning, Development and Infrastructure Act* 2016 will see the development of the *Planning and Design Code* that will document the rules against which development is assessed, and the Design Standards for public realm and infrastructure. The PDI Act 2016 also requires the preparation of a climate change policy describing policies and principles to promote development that is resilient to climate change.

The Department for Environment and Water (DEW) is responsible for state-wide climate change policies and the delivery of climate change programs. A Government Action Plan for the Climate Change Adaptation Framework in South Australia was published in August 2012[(11)]. Strategy 4.2 of this Plan is to create climate resilient urban areas and address the needs of the most vulnerable members of the community. DPTI are identified as the lead agency to undertake Action 4.2.1 to assess and address climate change impacts on South Australia's urban areas. Towards a Resilient State was published in 2018, it's the South Australian Governments Climate Change Adaptation Plan. Strategy 6 of the plan is to integrate climate change considerations into the instruments to be developed under Planning, Development and Infrastructure Act 2016 DPTI are identified as the lead agency to undertake this along with strategy 7 Integrate climate smart building and urban design performance outcomes in planning instruments.

At an individual building scale, the Building Code of Australia provides performance requirements linked to hazard management and it is the responsibility of builders to ensure compliance. Home or property owners also have responsibilities to inform themselves about the hazards that may impact their assets and adopt appropriate risk mitigation.

Rationale

The need for greater community resilience and making our buildings, infrastructure and public realm more resilient to extreme weather will become increasingly important as climate change results in more frequent and intense extreme weather events. As hazard leader for extreme weather, SASES has responsibilities to provide a coordinated and consistent approach to mitigation, including commenting on matters that are relevant to these responsibilities relating to planning and development.

Application

In the role of hazard leader, SASES may be sought to provide informal comment on development plan amendments or development applications. SASES should review the need for and where appropriate seek confirmation that the impact of future climate conditions on the increasing frequency and intensity of extreme weather events has been considered.

SASES should advocate this policy through the development plan amendments process, the proposed Planning and Design Code and the proposed State Planning Policy on climate change.

SASES Policy Statement #4

Development should not increase the risk from flooding on adjoining areas/land

Context

Living in a floodplain has an inherent risk, and the community and government need to recognise that all flood risk cannot be eliminated[(9)]. However across all levels of government it is identified that development should not increase the risk of flooding on adjoining land.

Increased flood risk may result from direct runoff, increased runoff as impervious areas increased, cut and fill, watercourse diversion, levees or changes in catchment land use. Land that is not identified as flood prone land (for example in a development plan) may become flood prone if development on adjoining land leads to an increase in the volume of water flowing off the development.

Roles and responsibilities

The South Australia State Emergency Management Plan (SEMP) identifies the Department for Environment and Water (DEW) as hazard leader for flooding. As hazard leader DEW are responsible for providing leadership in a coordinated and consistent manner to plan for, respond to and recover from flood events. SASES is the control agency for flooding, meaning they are responsible for directing and coordinating the response in an emergency situation.

Within the Hazards module of the SA Planning Policy Library, objective 4 supports development that is located and designed to minimise the risks to safety and property from flooding. Further to this, principle 6(4) prevents development that will increase the risk of flooding on other land.

The function of a council under the *Local Government Act 1999* includes taking measures to protect its area from natural hazards (such as flooding) and to mitigate the effects of such hazards[(12)]. Through its development plan a council can specify what can be undertaken on any piece of land, and the detailed criteria against which development applications will be assessed. Typically land prone to flooding is identified as a constraint to development within development plans. All development plans in South Australia refer to development on flood prone land (usually land inundated by a 100 year average return interval flood event) however some do not include development constraint maps that identify areas of flood risk.

Within the Building Code of Australia, there is a requirement to dispose of surface water (generated in a defined storm event) in a manner that avoids the likelihood of damage or nuisance to any other property.

Rationale

This policy is consistent with State Planning Policy and SASES' role in preventing extreme weather and flood events adversely impacting on community health and safety, homes, businesses and the State's infrastructure.

Application

SASES may be sought to provide informal comment on development plan amendments (DPA) and development applications (DAs). Development plans in general identify flood prone land as land that is inundated in a 100 year average return interval flood event. There are many areas where smaller flood events may impact the community, homes, businesses or infrastructure and a property that is not identified as flood prone may become flood prone if development on adjoining land leads to an increase in the volume of water flowing off the development. When providing input on DPAs or DAs, SASES should review the need for and where appropriate seek confirmation that proposed development will not increase the risk of flooding on adjoining land whether or not it is within a designated flood prone area.

SASES should advocate this policy through the development plan amendments process and the proposed Planning and Design Code.

SASES Policy Statement #5

Development should not increase the risk of landslip

Context

Landslip (mass movement) occurs on sloping ground where large slabs of the ground surface separate and slide downhill. Clearance of deep-rooted vegetation often contributes to landslip however excessive soil wetness and earthworks such as track or dam cutting are more frequently triggers for landslip events. The risk of landslip increases on nearly all slopes steeper than 30% once vegetation is cleared[(13)].

Landslip has the potential to cause injury and death and property and infrastructure damage. Road closures can create secondary impacts on access and egress, potentially restricting emergency evacuation.

Land in South Australia (outside the Adelaide metropolitan area) with potential for landslip is identified in a spatial dataset maintained by the Department for Environment and Water (DEW).

Roles and responsibilities

Landslip is not identified as an emergency incident within the State Emergency Management Plan (SEMP) and hence does not have an associated control agency responsible. In recent years the SASES has received requests for emergency assistance associated with landslip, often associated with extreme heavy rainfall and storm events.

Landslip is identified as a hazard within the SA Planning Policy Library (SAPPL) Policies are included to restrict development including cut and fill, and prevent the risk of landslip increasing on the site or on surrounding land. Although the SAPPL identifies that landslip hazard overlays may be included as a development constraint, mapping is not included in many council areas where landslip potential is high (eg City of Onkaparinga, District Council of Yankalilla and Mount Remarkable Council).

The risk of landslip is exacerbated where woody vegetation is cleared from steep slopes. Clearance of native vegetation is regulated under the Native Vegetation Act 1991 however clearance of non-native vegetation is not restricted unless the trees are regulated or significant under the *Planning, Development and Infrastructure Act* 2016.

Rationale

In many areas where landslip potential is high, Council development plans do not contain hazard overlays that identify these areas. This makes it difficult for developers and planners to identify where landslip needs to be considered in the development application process. This policy is consistent with the SAPPL policy however its implementation may be hindered by a lack of hazard mapping within planning documents.

Application

In the role of hazard leader, SASES may be sought to provide informal comment on development plan amendments (DPA) or development applications (DAs).

SASES should advocate this policy through the development plan amendments process and the proposed Planning and Design Code.

SASES Policy Statement #6

Development should not rely solely on flood levees or flood control dams for protection from flood inundation

Context

Mitigating flood risk to existing development can be achieved by reducing the frequency of flood inundation by modifying flood behaviour and/or the flood plain, or by reducing the consequences of flooding by reducing the vulnerability of the community, homes, businesses and infrastructure. Flood mitigation programs generally rely on a variety of actions including physical works (eg flood control dams or levees), warnings and emergency response, planning and development controls and community engagement.

Levees are embankments or walls constructed along the course of a river or in coastal areas to prevent flood waters from inundating adjoining land. Although they prevent flooding, they also act to artificially contain watercourses which can lead to higher and faster flows. Levees are almost never designed to exclude the maximum probable flood level and hence are likely to overtop in extreme floods. They are usually constructed from soil or earth, meaning they are vulnerable to erosion and cracking, and require regular inspection and maintenance to maintain effective flood containment.

In South Australia, major levees have been constructed along a number of watercourses including the Gawler River, the lower reaches of the River Murray and along the coast near Port Augusta, Port Pirie and Whyalla.

Flood control dams hold back water that would otherwise reach the floodplain however for dams to have effective flood control, water levels must be sufficiently low to allow flows to be retained. In the Adelaide region, flood control dams have been constructed on a number of watercourses including Cobbler Creek, North Para River near Turretfield and the Sturt River. Other reservoirs and small dams constructed for the storage of water for supply provide a level of flood protection for downstream areas of the catchment.

Managing the floodplain – a guide to best practice in flood risk management in Australia (AEMI Handbook 7[(9)]) is considered best practice in terms of flood management in Australia. The Handbook provides an outline of best practice and a vision for managing the flood threat to communities inhabiting floodplains in Australia and discusses how to apply information. It was developed with consideration to the National Strategy for Disaster Resilience and the findings of recent State and national reviews following the multiple flood events of 2010 and 2011 that resulted in widespread flooding. The Handbook describes a range of measures through which flood risk can be mitigated, advocating an approach that is fit for purpose and meets community aspirations.

Roles and responsibilities

The South Australian planning system identifies current responsibilities for local and State government relating to the development of planning policy and assessment of proposed development. The South Australian Planning Policy Library contains reference to levees in the coastal zone module however there is no reference to levees in the hazard module. Some development plans (e.g. Alexandrina Council) have specific requirements for levee construction associated with primary production land uses. The Gawler (CT) *Development Plan* however, advocates the avoidance of using levees for the protection of crops in flood prone areas. Within the Gawler Rivers Floodplain Area the development plan prevents the construction of privately owned levees for flood protection unless it can be demonstrated that the levee or floodwall does not increase the extent or hazard flood risk of land upstream or downstream.

The functions of a council under the Local Government Act 1999 include taking measures to protect its area from natural hazards (such as flooding) and to mitigate the effects of such hazards, including providing infrastructure to protect people or assets from hazards[(12)].

In the South East region, the significant drainage network is managed by the South Eastern Water Conservation and Drainage Board[(14)] in order to prevent or minimise damage caused by flooding the South East.

Ongoing community education is required to ensure that the population is aware of the risk of levee overtopping and associated emergency management plans, and does not lapse into the common belief that a levee or dam

provide protection against all floods. Both DEW and SASES, as hazard leader and control agency respectively, and local government have community engagement and education responsibilities.

Rationale

Levees can form part of an effective flood risk reduction strategy however levees can fail, no levee is flood proof and no two floods are the same. While flood control dams provide a greater security of protection from flood waters, they are also not flood proof and successive heavy flows can reduce the capacity to provide flood protection. For these reasons, development should not solely rely on flood levees or flood control dams for protection from flood inundation.

Application

In the role of hazard leader, SASES may be sought to provide comment on development plan amendments (DPAs) or development applications (DAs). Development plans in general identify flood prone land and identify constraints and risk mitigation measures where development is proposed on flood prone land. When providing input on DPAs or DAs, SASES should review the need for and where appropriate advocate where development requires flood protection, this should include a range of measures to reduce flood frequency and consequences and not rely on flood levees or flood control dams for protection. The individual circumstances of each DPA or DA should be considered as there is no universal solution to flood mitigation.

SASES should advocate this policy through the development plan amendments process and the proposed Planning and Design Code.

SASES Policy Statement #7

New dam approval should require applicants to consider the potential consequences of dam failure

Context

Dams may be constructed to provide stock, irrigation or fire water supply or may be constructed for flood control purposes. Dam failure refers to the failure to meet design objectives and may not be associated with the collapse of a dam. Failure may include leakage or erosion or the inability of a dam to retain water as designed. It may lead to a sudden release of water with the potential to cause injury, loss of life or damage to land, assets (including the natural environment) or infrastructure.

The Australian National Committee on Large Dams (ANCOLD) have prepared guidelines applicable to dams with the potential to cause loss of life or serious environmental or physical damage if failure occurs[(15)]. Although not prepared for small dams, the guidelines can be used to assist with decision on small dams. The Victorian State Government has also released guideline documents to minimise the potential for risk from the construction and maintenance of dams[(16)]. In other States in Australia, large dams or those with the potential to cause significant damage if they fail need to have a Dam Safety Emergency Plan. This is not currently required in South Australia.

Roles and responsibilities

The construction, enlargement or modification of a dam in South Australia is identified in the *Natural Resources Management Act* 2004 as a water affecting activity[(17)]. Most Natural Resource Management (NRM) Regional Strategic Plans identify principles for water affecting structures such as dams are designed, constructed and managed in a manner to minimise the risk of structure failure and to ensure flood risk is not increased upstream or downstream of a dam. In most NRM regions, a permit from the relevant NRM Board or local council development approval may be required. Permit applications are assessed against the principles or requirements of the relevant NRM strategic plans.

Generally larger dams or those in prescribed surface water areas require a permit. The permit requires engineering drawings and calculation sheets to be provided that include flood flow estimates, spill way design (including flood capacity) and earthworks design. The permit also requires the identification of environmental risks associated with the construction of the dam however the permit forms do not require applicants to address specific requirements for consideration of the risks associated with dam failure.

A dam becomes “development” and requires approval under the *Development Act* 1993 where it involves the excavation or filling of land for the purposes of a dam -

(a) where a levee or mound with a finished height greater than 3 metres above the natural surface of the ground is to be formed; or

(b) where a retaining wall which retains a difference in ground levels exceeding 1 metre is to be used or formed; or

(c) where the dam is in the Hills Face Zone, in a Watercourse Zone, Flood Zone or Flood Plain delineated by the relevant development plan, or in any other zone or area shown as being subject to flooding or inundation in the relevant development plan; or

(d) where the dam is to have a capacity exceeding 5 megalitres[(18)].

However the construction, alteration or removal of a dam on land used for farming purposes, except where the dam is of masonry construction is considered to be complying in terms of building rules consent[(19)]. In effect, this means that for the dams prescribed above, development plan consent is required, but the dam is not assessed (apart from where of masonry construction) for adherence to any building standards.

The SA Planning Policy Library contains a limited number of policies in relation to dams, with most appearing to have a focus on potential environmental impacts arising from dam construction, rather than on the dam itself.

Should a dam fail, its owners may be held legally liable for all associated damage.

Rationale

There is currently no requirement for applicants to consider dam safety as part of the approval process and dam construction is generally not assessed for compliance with any building standards. There is also no requirement for dam safety management plans as required elsewhere in Australia. As hazard leader for extreme weather and control agency for flooding, SASES has a role in ensuring development such as dam construction is subject to an assessment of the level of risk to life, safety, health and property from extreme weather and flood events.

Application

It is not anticipated that SASES will be asked to comment on individual applications for dam construction. Subsequently SASES should advocate to DEW and DPTI for dam approvals to require consideration of the potential consequences of dam failure.

SASES Policy Statement #8

Hazardous materials should be stored and located to minimise the risk of escape during extreme weather or flood events

Context

Hazardous materials include dangerous goods that pose an immediate physical or chemical hazard, such as fire, explosion, corrosion and toxicity that may affect life, health, property or the environment as well as substances that have the potential to cause immediate or long term health effects. Hazardous materials may include poisons, substances that cause burns or skin and eye irritation, and substances that may cause cancer, explosives, flammable liquids and gases, corrosives, chemically reactive or acutely (highly) toxic substances.

Roles and responsibilities

Hazardous materials are covered by a number of separate regulations, standards and codes. The South Australian Dangerous Substances Act 1979 and Dangerous Substances Regulations 2002 set out requirements regulating the keeping and transport of dangerous substances identified in the regulations as those on the dangerous goods list published in the *Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code)*.

A number of Australian Standards also apply to the storage and handling of hazardous materials including AS 1940:2004 The Storage and Handling of Flammable and Combustible Liquids (and subsequent 2 amendments) and AS 3780:2008 The Storage and Handling or Corrosive Substances (and subsequent amendment). There are also a number of relevant codes of practice including the *National Code of Practice for the Storage and Handing of Workplace Dangerous Goods* [NOHSC: 2017 (2001)] and the *Code of Practice – Managing Risks of Hazardous Chemicals in the Workplace* (Safe Work Australia, 2012).

Within the Hazards section of the SA Planning Policy Library, objective 10 and a number of principles of development control describe the need to store and contain hazardous materials in a manner that minimise the risk to public health and safety and the potential for contamination.

To minimise the risk of environmental harm, the *Environmental Protection Authority (EPA)* have published a number of codes of practise for activities that have the risk of releasing hazardous materials to the environment including wastewater systems, intensive agriculture and milking shed effluent, and guidelines for bunding and spill management.

The escape of hazardous materials is a listed hazard under the *State Emergency Management Plan* with SafeWork SA identified as the hazard leader. The CFS and MFS are identified as the control agency for hazardous or dangerous materials emergencies.

Rationale

Although SASES does not have legislated responsibilities relating to the management of dangerous goods or hazardous substances, extreme weather or flood can lead to conditions that can increase the risk of accidental escape of dangerous goods or hazardous substances and subsequent risk to people, property or the environment.

Extreme storm (wind, hail or heavy rain) has the potential to damage buildings used for storage, flood waters can inundate storage areas and heavy rains may fill a bund reducing the effective volume for spill storage. Combustible substances may be more likely to ignite at higher temperatures. During extreme heat, cooled storage areas may be impacted by electricity supply disruptions.

SASES advocate the use of a risk based approach to assess the potential impact of hazardous material escape associated with extreme weather or flood.

Application

This policy applies to all activities where hazardous materials are used, produced or generated either as an input, direct product, waste or by-product. Hazardous materials are frequently associated with industrial land uses and when a development plan amendment or development application identifying industrial land use is referred, the SASES should review the need for and where appropriate seek confirmation that provisions are included that address the safe storage of hazardous materials.

SASES Policy Statement #9

Road provision should provide adequate access and egress to development during an extreme weather or flood event. Proposed development should not impede or block access and egress routes of existing developments

Context

In the event of extreme weather or flooding, emergency services may be required to provide support, assistance, rescue or evacuation. Road access to development means enabling vehicle approach and access. Egress enables safe evacuation from an emergency.

Each year SASES receives thousands of requests for emergency assistance. Without a well-designed and maintained road network, operational staff and volunteers may not be able to access those in need.

The road network in South Australia is maintained by both State government (for arterial roads) and Councils (for local roads). In many regional areas of the State, unsealed local roads provide the only access and egress to properties and following heavy rainfall and storm events, roads and associated bridges and culverts are sensitive to damage from erosion. Fallen trees and standing water can lead to temporary road closures.

Roles and responsibilities

The design and construction of roads and road infrastructure is guided by a range of DPTI standards based on the Austroads Guides[(20)]. These standards describe the design, construction, maintenance and operation of the road network.

The South Australian planning system identifies responsibilities for local and State government relating to the development of planning policy and assessment of proposed development. The South Australian Planning Policy Library contains a number of principles relating to provision of access for emergency vehicles within the Coastal Areas, Hazards and Land Division Modules. Within the Hazard module, principle 15 requires vehicle access and driveways created by land division to be designed and constructed to facilitate safe and effective operational use for fire-fighting and other emergency vehicles and residents.

Volume one of the *Building Code of Australia* describes requirements for building access and egress including requirements to allow safe evacuation from buildings. For non-residential buildings, the Australian Standard AS 3745-2010 *Planning for emergencies in facilities* provides guidance on evacuation procedures. The AS 1428 series *Design for access and mobility* provides standards for disabled access.

Road maintenance is the responsibility of the road owner, i.e. private owner or local or State governments.

Rationale

SASES operations including emergency response require the provision of a safe and functional road network. Maintenance of existing roads is required to enable provision of access and egress, particularly after extreme weather and flood events. The design and construction of new roads needs to consider the current and future impacts of extreme weather and floods and ensure that access and egress to existing development is not impeded.

Application

This policy applies to the design and construction of new roads as well as the maintenance of existing roads.

In the role of hazard leader, SASES may be sought to provide comment on development plan amendments (DPAs) or development applications (DAs). When providing input on DPAs or DAs, SASES should review the need for and where appropriate seek confirmation that proposed development will not impede or block access and egress to existing development.

SASES should advocate this policy through the development plan amendments process and the proposed Planning and Design Code.

SASES Policy Statement #10

Buildings, streetscapes and neighbourhoods should be designed to enable safe evacuation

Context

In the event of an emergency, evacuation may be required to move people from a dangerous or potentially dangerous location to a safer location. Flood, storm and bushfire may create conditions that lead to recommendations or requirements for evacuation and under the *Fire and Emergency Services Act* 2005 (SA) emergency response workers from SASES, CFS or MFS are given powers to force evacuations. Emergency evacuations can range in scale from the removal of people from a house as a result of house-fire or storm emergencies, to the large scale evacuation of people from a neighbourhood or suburb to avoid a bushfire, flood or storm.

Successful emergency evacuation requires the safe and efficient movement of people, and the time required to move people to safety can be influenced by the number of people residing or visiting the area and the design and capacity of transport networks. Depending on the emergency and location, evacuation may be required by driving, riding or walking. Potential evacuation requirements differ between emergencies, with evacuation from flood inundation often more easily predicted than those from storms or bushfire.

Roles and Responsibilities

The development of buildings, streetscapes and neighbourhoods is guided by the State planning system and in particular the SA Planning Policy Library SAPPL). Within the SAPPL there are number references to the design of streetscapes and neighbourhoods that enable emergency vehicle access and public safety however there are no references to evacuation requirements.

The LGA's Public Realm Urban Design Guidelines (2014) describe a number of design principles to guide Councils in the design of development that affects the public realm (ie streets, parks, green spaces and outdoor places). Whilst there are a number of principles relating to public safety, traffic safety, property safety and personal security, there is no reference to evacuation within the document.

The National Construction Code (NCC) requires buildings to be provided with means of evacuation which allow occupants time to evacuate safely without being overcome by the effects of an emergency. *The Development Act 1992* requires development to be certified as complying with the NCC. In addition to these requirements, building owners and occupiers have legal responsibilities to ensure the safety of occupants through the provision of *Essential Safety Provisions (Development Regulations 1993)*.

Rationale

The design and layout of buildings, streetscapes and neighbourhoods can influence the effectiveness and safety of evacuation in the event of an emergency. It is important that those with responsibilities for the design, development and management of the buildings, streetscapes and neighbourhoods consider the safe evacuation of residents and visitors. This will make it easier for the SASES to provide safe and effective evacuations when required.

Application

With legislated powers to force evacuation, SASES should be advocating any approach that seeks to improve the safety and efficiency of evacuation.

In the role of hazard leader, SASES may be sought to provide comment on development plan amendments (DPAs) or development applications (DAs). When providing input on DPAs or DAs, SASES should review the need for and where appropriate seek confirmation that evacuation requirements have been considered in the design of neighbourhoods and streetscapes.

SASES should advocate this policy through the development plan amendments process, the proposed Planning and Design Code and for evacuation to be included as a design principle in documents such as the Public Realm Urban Design Guidelines.

SASES Policy Statement #11

Building and infrastructure design and construction should be structurally adequate to withstand expected depth and velocity of flood flow, maximum probable wind speeds, hail loading and extreme heat

Context

The design and construction of buildings and infrastructure takes into account a period of time over which the asset should function effectively and provide the required service. Design processes subsequently take into account potential sources of failure including hazards that may affect effective function, such as flooding, extreme weather such as wind and hail, and heat.

Modelling and research indicates extreme weather events are and will continue to increase in frequency and intensity. Substantial increases in the frequency of hot days, maximum temperatures and the duration of heatwaves are projected with very high confidence across all of South Australia. Although average annual rainfall is projected to decline, there is high confidence that heavy rainfall intensity is projected to increase across all of South Australia(3). New buildings and infrastructure will need to consider these projections during the design process.

Roles and responsibilities

The structural adequacy of buildings is largely dealt with under various requirements of the National Construction Code. Structural provisions of the BCA require a building or structure to perform adequately even under (reasonably expected) conditions including hazards such as wind, earthquake, rainwater and thermal effects. Specific requirements relate to the construction of buildings in defined flood hazard areas.

Understanding historic and potential future extreme weather events is required for design processes to adequately incorporate 'reasonably expected' conditions. In particular, flood hazard mapping including flood depth and flow velocity and wind hazard mapping need to be readily available to inform the design process.

Infrastructure design and construction is governed by a range of standards and guidelines at Federal, State and local levels including Australian Standards and departmental design standards. These standards may refer to hazards including design rainfall events or design wind speeds.

Within the South Australian Planning Policy Library there are a number of policy objectives within the Coastal Areas and Hazards modules that refer to the protection of development from the risk of natural hazards. Many of the objectives and principles relate to the location of development however there are also a number that refer to the design and construction of buildings. Principle 2 requires development located on identified hazard prone land to be designed with appropriate precautions being taken against the relevant hazards.

There are few guidelines requiring buildings and infrastructure to consider the impact of extreme heat in structural design or construction. Historically rail transport infrastructure has been vulnerable to extreme heat with many tracks closed due to buckling however in recent years significant investment has been made in rail track upgrades across the State including replacing timber sleepers with concrete sleepers which prevent buckling.

Rationale

During extreme weather events, damage to buildings and infrastructure can occur as a result of heavy wind, rain or hail. SASES receives hundreds of requests for assistance as a result of building impacts or collapse as a result of extreme weather.

Application

The SASES will advocate for the preparation of and distribution of hazard mapping data to allow building design and construction to appropriately consider reasonably expected conditions.

In the role of hazard leader, SASES may be sought to provide comment on Development applications (DAs). When providing input, SASES should review the need for and where appropriate seek confirmation that building and/or infrastructure design and construction has considered the expected depth and velocity of flood flow, maximum probable wind speeds, hail loading and extreme heat.

SASES should advocate this policy through the development plan amendments process and the proposed Planning and Design Code.

SASES Policy Statement #12

Residential buildings should be designed and constructed to minimise heat and cold stress and provide year-round thermal comfort while reducing reliance on artificial heating and cooling

Context

People with vulnerabilities including the aged, children, ill and people with disabilities have an increased risk of adverse health impacts from both extreme heat and cold conditions.

Thermal comfort is influenced by both psychological and physiological components that must be met to feel comfortable and is influenced by temperature, humidity, air movement and exposure to sources of heat or cold. Heat stress can occur when an individual's core temperature rises above 38^{o}C, and cold stress when core temperature falls below 35^{o}C.

Research has found that having air conditioning in bedrooms lowers the risk of mortality[(21)] and heat-related hospitalisation[(30)] during heat wave events. As well as reducing the risk of mortality and hospitalisation, maintaining thermal comfort within houses can reduce mental health and heat related illness and improve mental well-being.

Climate change modelling projects predict increases in the frequency and intensity of extreme heat and hot days which is likely to result in increased risk to community health and safety, particularly for people with vulnerabilities.

Roles and Responsibilities

As the hazard leader for extreme weather (including extreme heat) SASES is responsible for providing leadership in a coordinated and consistent manner to plan for, respond to and recover from hazards associated with extreme heat. Subsequently SASES has a role to play in advocating that new buildings be designed to maximise thermal comfort.

Within the Energy Efficiency section of the SA Planning Policy Library, the objectives and principles encourage development to be designed and sited to conserve energy, with reference to solar access for natural light. The City of Adelaide Development Plan takes this a step further, identifying that buildings should provide adequate thermal comfort for occupants and minimise the need for energy use for heating and cooling by allowing for natural cross-ventilation to reduce internal temperatures in summer, locating and treating windows to reduce summer heat loads and using landscaping.

The *Planning Development and Infrastructure Act 2016* will see the preparation of a climate change policy describing policies and principles to promote development that is resilient to climate change. It is recommended that the SASES advocate that residential building thermal comfort be included in this policy.

The National Construction Code (NCC) describes all construction requirements for residential buildings. The three volumes of the NCC include requirements for access and egress, energy efficiency, sustainability and health and amenity. Volume One and Volume Two of the NCC comprise the Building Code of Australia (BCA). *The Development Act 1992* requires development to be certified as complying with the NCC and all new homes built must meet the minimum energy efficiency requirements prescribed in the BCA.

The Nationwide House Energy Rating Scheme (NatHERS) provides a measure to estimate a home's potential heating and cooling requirements. The objective of NatHERS is to help make Australian homes more comfortable for their inhabitants by calculating how the local climate heats and cools a house. Requirements for artificial heating and cooling to maintain comfort levels is calculated and a star rating applied based on these requirements. In South Australia, an energy requirement of at least 6-stars is required for most new homes. The maximum 10 star rating means that no artificial heating and only minimal cooling is required. Some developments in South Australia (e.g. Bowden and Tonsley) are requiring residential buildings to exceed the 6 star rating.

Rationale

Although SASES does not have legislated responsibilities relating to the design or construction of residential buildings, there is great potential for improving health outcomes through the provision of housing that provides adequate thermal comfort.

SASES advocates residential buildings be designed to minimise heat and cold stress and provide year-round thermal comfort while reducing reliance on artificial heating and cooling and encourages the development of residential buildings that exceed the 6 star energy rating.

Application

This policy applies to the design and construction of all residential buildings, including multi-level apartments, public and affordable housing.

In the role of hazard leader, SASES may be sought to provide comment on development plan amendments (DPAs) or development applications (DAs). When providing input on DPAs or DAs, SASES should review the need for and seek confirmation that residential buildings will be designed and constructed to minimise heat and cold stress and provide year-round thermal comfort.

SASES should advocate this policy through the development plan amendments process and the proposed Planning and Design Code.

SASES Policy Statement #13

Buildings, infrastructure, streetscapes and neighbourhoods should be designed to mitigate the impacts of extreme heat, including through the installation of green infrastructure

Context

Extreme heat events impact on the physical health of people throughout the state. Direct heat related illnesses include heat cramps and heat stroke, and extreme heat also triggers or exacerbates pre-existing medical conditions, causing higher rates of conditions such as heart attacks and renal failure[23]. In particular, people with vulnerabilities including the aged, children, people with chronic illness or disabilities are particularly at risk of adverse health impacts.

In urban areas, higher temperatures than regional areas are often experienced as heat is produced and retained by hard surfaces and structures such as roads, paving and windows.

Green infrastructure is the strategically planned network of green spaces and environmental or water management features that deliver a wide range of environmental, economic and social benefits including provision of clean water and clean air, more attractive and greener cooler cities, mitigation of urban heat island effects and improved wildlife habitat and biodiversity. It can mitigate extreme heat by shading hot surfaces, increase evapotranspirative cooling and modifying local scale wind patterns. Green infrastructure features can operate and provide benefits at small scales such as living walls, roof gardens and pathways and larger scales such as parks and reserves, transport corridors, water sensitive urban design features such as swales and rain gardens, watercourses and wetlands.

Modelling outputs project substantial increases in the frequency of hot days, maximum temperatures and the duration of heatwaves across all of South Australia[3]. Regional climate change adaptation plans across the state have identified the need for 'climate ready' buildings and places that include green infrastructure to mitigate high urban temperatures.

Roles and responsibilities

As the hazard leader for extreme weather (including extreme heat) SASES is responsible for providing leadership in a coordinated and consistent manner to plan for, respond to and recover from hazards associated with extreme heat. Subsequently SASES has a role to play in advocating that buildings, infrastructure, streetscapes and neighbourhoods are designed to mitigate the impacts of extreme heat.

The *Draft 30 Year Plan for Greater Adelaide - Update 2016* (part of the Planning Strategy) contains a number of policies to mitigate against and adapt to a changing climate and extreme heat. In particular Policy 102 aims to promote green roofs, water sensitive urban design techniques and other appropriate green infrastructure in higher density and mixed-use development to assist with urban cooling. Policy 116 aims to mitigate the impact of extreme heat events by designing development to create cooler communities through the use of green infrastructure.

Within the Residential Development module of the South Australian Planning Policy Library principle 12 promotes the provision of private open space to reduce urban heat loading. There are also principles within the landscaping module to minimise hard paved surfaces to minimise heat absorption and reflection and within the transport module to including landscaping within vehicle parking areas to reduce heat loads in summer.

The State Water Sensitive Urban Design (WSUD) policy[24] outlines aims, objectives and targets for WSUD and describes techniques that can be included in large and small scale development. While the objectives of WSUD relate to the conservation of water and management of runoff quality and quantity, the benefits extend to improving urban amenity and ameliorating urban heat island effects.

Within the Building Code of Australia, requirements for energy efficiency are described. The provision of green infrastructure could assist in meeting energy efficiency requirements however are not required.

Rationale

With climate modelling projecting an increase in the number of hot days, and increasing frequency and intensity of extreme heat events, the importance of incorporating green infrastructure is increasingly important. Reducing urban heat will have positive outcomes for community health and wellbeing.

Application

In the role of hazard leader, SASES may be sought to provide comment on development plan amendments (DPAs) or development applications (DAs). When providing input on DPAs or DAs, SASES should review the need for and where appropriate seek confirmation that the proposed design aims to mitigate the effects of extreme heat, and should advocate the inclusion of green infrastructure.

SASES should advocate this policy through input to the development of the Planning and Design Code and for green infrastructure to be included as a design principle in documents such as the *Public Realm Urban Design Guidelines*.

Glossary

The following abbreviations and terms are used within this document.

Term	Description
Development	Any building work, change in land use, construction or alteration or any act or activity defined as development in the *Development Act 1993 (SA)* or associated regulations.
Extreme weather	For the purposes of this policy, extreme weather includes extreme heat and extreme storm.
Extreme heat	An extended period of very high temperatures, which is related but not confined to heatwave conditions.
Extreme storm	Heavy rainfall conducive to flash flooding (in excess of 30 mm/h), damaging wind (average of 63 km/h or greater, or gusts of 90 km/h or greater) and/or damaging hailstones (2 cm in diameter or greater).
Flood	The covering of normally dry land by water that has escaped or been released from the normal confines of: • Any lake, river, creek or other natural water course, whether or not altered or modified • Any reservoir, canal or dam • Coastal or marine waters on to land • Pipes, dams, levees or other infrastructure due to structural failure, operations, malfunction, accident or other reasons.
Hazard	A source of potential harm, or a situation with a potential to cause loss.

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Legislation

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