EMERGENCY ALERT.
BE WARNED. BE INFORMED.

ASSESSMENT OF THE EFFECTIVENESS OF EMERGENCY ALERT

FINAL REPORT

TORRENS RESILIENCE INSTITUTE

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An Australian Government Initiative

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EXECUTIVE SUMMARY

Aim and scope

Emergency Alert (EA) is a telephone-based emergency warning system used by all states and territories in Australia (less Western Australia) to alert people of potential risks and directs them to appropriate media. The Commonwealth Government provided $15 million for the procurement of the system, and the states and territories agreed to fund its application. Since EA became operational on 1 December 2009, it has been used in New South Wales, Victoria, South Australia, Queensland and the Northern Territory for flood, tsunami, bushfire, storm surge, chemical incident and missing person emergencies.

The evaluation of EA formed part of the National Emergency Management Projects (NEMP) scheme for 2010-11. NEMP projects aim to strengthen the nation's disaster resilience by supporting measures to strengthen communities, individuals, businesses and institutions to minimise adverse effects of disasters on Australia.

The evaluation aimed to assess the effectiveness of EA by addressing two primary questions:

a. Are the users of EA satisfied that the system enables them to send messages which inform people of potential risks and directs them to appropriate media?

b. Are recipients of EA messages satisfied with the system; i.e. do the messages provide them with the information they need and expect?

The project was conducted in three phases: a literature review and scoping study, a pilot evaluation in Victoria, followed by an evaluation of the other states and territories. Twenty users and operators of EA, and 1,500 households were interviewed.

Context of evaluation

The analysis of past emergencies and disasters points to communications as a limiting factor in disaster response. Improved communication is an area where governments and the emergency services can use technology to great advantage in getting information to the public directly and quickly. Telephones provide a unique and powerful means of sending intrusive and targeted messages to warn people of potential disruptive events.

On 30 April 2009, in the wake of the Victorian bushfires disaster, the Council of Australian Governments (COAG) agreed to take immediate steps to enhance the country's emergency management arrangements through the development of a telephone-based emergency warning system. COAG directed that the initial system should use landlines and mobile phones based on the billing address of each subscriber. They also agreed to undertake further research into a capability to deliver warnings based on the location of a mobile phone.

The Government of Victoria was invited to lead the project. On 9 July 2009, a selective tender for a National Emergency Warning System (NEWS) was issued, and on 22 September, Telstra was awarded a contract to develop and build the initial system. NEWS subsequently became known as Emergency Alert. The system, which was the first telephony-based warning system to be developed for use in Australia, became operational on 1 December 2009.

The evaluation of EA assesses the level of satisfaction from operators and recipients of EA messages. It also explores the opportunity to extend the current capability in the light of lessons learned and to meet society's needs and expectations. Indeed, a key challenge facing governments and the emergency services will be to manage society's growing expectations from EA and other media, including radio, official websites, and increasingly with informal social networking.

Key findings

The evaluation concluded that EA achieves its purpose. There is overall satisfaction with the current system of message development and delivery, and users have confidence in its future development.

Users stressed that EA is a 'system within a system' and its effectiveness is dependent on: (1) the suitability and rigour of community preparedness; (2) the quality of the information available to EA operators prior to issuing an alert/warning; (3) the ability to predict the consequences of alerts/warnings; and (4) real-time closure of a disruptive event.

Community preparedness is considered as the weakest part of the overall warning system. Issues of particular concern are the need to 'localise' EA education, the need to make families having recently arrived in Australia, international students and indeed young people generally, more aware of EA, and the need for such groups to have plans in place to react appropriately to a warning message.

There is a need to improve the way in which information is provided using various media: radio, TV, official websites, social networking and RSS feeds, in addition to EA messages via fixed line and mobile phones. The development of a Common Alerting Protocol should enable a consistent warning message to be disseminated simultaneously using different media.

The issue of real-time closure is considered a problem, especially in a developing campaign where a series of EA messages may have been sent. This may become a greater problem in the future as social media becomes more commonly used, and EA messages are updated or even contradicted by informal sources of information.

There is a demand for more sharing of lessons learned and new ideas on how to better exploit EA.

EA provides a unique and powerful means of providing intrusive and targeted messages. As phones become more 'intelligent' it may be possible to use EA as a means of informing the public of potential harm which falls short of an 'emergency'. The possible use of EA in such circumstances should be routinely reviewed by the EA Steering Committee by drawing on the experience of other warning systems in other countries, while noting that such use could 'desensitise' people to the importance and urgency of EA messages.

Households are generally satisfied with the delivery and content of EA warning messages. The survey shows the system provides most people with most of the information they need and expect.

- 83% of the people received messages;
- of those who received messages, 98% said the message was delivered in full and 97% said the message was clear;
- 84% of the people understood and acted upon the warning message;
- on receiving the message, nearly 87% of the people said they would seek further information; and
- 84% said EA fully met or exceeded their expectations.

Women are more likely than men to contact neighbours, friends and families (89% vs 80%), and are more likely than men to follow the instructions in the EA warning message (84% vs 72%). Targeted community education is needed to encourage men to seek further information, and to act on the information given in EA warning messages.

25% of people said they were not aware of EA, and 29% of people said they were not sufficiently prepared for an emergency event. There is a need to place even greater emphasis on community education and preparedness in areas prone to extreme weather events, bushfires and other natural hazards.

ASSESSMENT OF THE EFFECTIVENESS OF EMERGENCY ALERT

FINAL REPORT

PART ONE: INTRODUCTION

1.1 Background

On 30 April 2009, in the wake of the Victorian bushfires disaster, the Council of Australian Governments (COAG) agreed to take immediate steps to enhance the country's emergency management arrangements through the development of a telephone-based emergency warning system. COAG directed that the initial system should use landlines and mobile phones based on the billing address of each subscriber. They also agreed to undertake further research into a capability to deliver warnings based on the location of a mobile phone.[1]

The Government of Victoria was invited to lead the project. On 9 July 2009, a selective tender for a National Emergency Warning System (NEWS) was issued, and on 22 September, Telstra was awarded a contract to develop and build the initial system. NEWS subsequently became known as Emergency Alert (EA). EA was the first telephony-based warning system to be developed for use in Australia.

The EA system was tested in October, culminating in a public trial at a number of regional locations in Victoria in November. The system became operational on 1 December, and has been used in New South Wales, Victoria, South Australia, Queensland and the Northern Territory for flood, tsunami, bushfire, storm surge, chemical incidents and missing person emergencies. Western Australia has its own telephone-based warning system.

This report provides the findings of an evaluation of EA, and forms part of the Attorney-General's Department (AGD)'s program of National Emergency Management Projects for 2010 – 11.

The project was implemented by the Torrens Resilience Institute, with direction and guidance provided by AGD, Victoria's Office of the Emergency Services Commissioner (OESC) and the South Australian Fire and Emergency Services Commission (SAFECOM).

1.2 Aim and Scope of Evaluation

The evaluation aimed to answer two primary questions:

a. Are the users of EA satisfied that the system enables them to send messages which inform people of potential risks and directs them to appropriate media?

b. Are recipients of EA messages satisfied with the system; i.e. do the messages provide them with the information they need and expect?

1.3 Context of Evaluation

The analysis of past emergencies and disasters points to communications as a limiting factor in disaster response. Improved communication is an area where governments and the emergency services can use technology to great advantage in getting information to the public directly and quickly. Telephones provide a unique and powerful means of sending intrusive and targeted messages to warn people of potential disruptive events.

The decision by COAG for an accelerated development and deployment of a national telephony-based warning system was taken following the Victorian bushfires of 2009. The urgent need for such a system was confirmed in the final report of the Victorian Bushfires Royal Commission. COAG directed that the warning system should be ready in time for the 2009/10 bushfire season. This target was ambitious, and OESC Victoria should be congratulated for delivering an operational system on time and to budget.

This evaluation of EA assesses the level of satisfaction from operators and recipients of EA messages. It also explores the opportunity to extend the current capability in the light of lessons learned and to meet society's needs and expectations. Indeed, a key challenge facing governments and the emergency services will be to manage society's growing expectations from EA and other media, including radio, official websites, and increasingly with informal social networking.

1.4 Terms and Definitions

For the purposes of this study:

a. EA refers to the system (equipment, software, protocols and procedures) developed for the Government of Victoria on behalf of COAG.

b. A *warning* is a message which aims to inform people of an impending or current threat and/or to promote appropriate actions. *(National Telephony Warning System Guidelines)*

c. A *community* is a group of people with a commonality of association and generally defined by location, shared experience or function. In this study, the term *community* refers to a group of people from a common location.

d. A *disruptive event* is an unwanted situation which has the potential to become an emergency or even a disaster.

e. An *emergency* is an event, actual or imminent, which endangers or threatens to endanger life, property or the environment, and which requires a significant and coordinated response.

f. A *disaster* is a condition or situation of significant destruction, disruption and/or distress to a community.

Technical terms as defined in the Emergency Management Australia website have been used in this report. For convenience, the term *State* is used to describe a state or territory in Australia.

A summary of the key terms and definitions used is at Appendix 1.

1.5 Project Advisory Group

An Advisory Group was established to oversee the project and ensure that it met the requirements of the Commonwealth and States' Governments, the EA Steering Committee,

the emergency services and the intended beneficiaries of EA. The Project Advisory Group comprised:

Ms Kate Fitzgerald and Mr Rob Lee	Assistant Director (until 31 May 2011) Director Emergency Management Capability Development Branch AGD, Australian Government
Ms Julie Frittum	Manager, Policy and Strategy SAFECOM Government of SA
Mr Joe Buffone	Deputy Emergency Services Commissioner (Policy & Planning) OESC Government of Victoria

Reports on the progress, findings and recommendations of the EA evaluation were provided to the EA Steering Committee and the National Emergency Management Committee through the Project Advisory Group.

PART TWO: UNDERSTANDING THE REQUIREMENT

This section of the report describes the issues which have informed the requirement for a national telephony-based warning system in Australia and may influence future developments and enhancements: the extent and immediacy of the threats facing people; governments' obligation to inform the public of immediate risks; society's needs and expectations; the concept of shared responsibility; and the purpose of emergency alerts and warnings.

2.1 Threats and Hazards in Australia

2.1.1 Natural hazards

In 2010/11, Australia experienced an unprecedented number of natural disasters, resulting in over $9 billion damage to critical infrastructure, crops, the mining industry and tourism. Most of the damage was caused by weather-related events, yet just 12 months earlier Australia experienced its highest ever loss of life from a bushfire in Victoria. Understanding the likelihood and immediacy of risk from each category of natural hazard is important in defining the requirement for EA.

Floods

Australia has long been known as the land of droughts and flooding rains. Historical records show over 2,300 flood-related fatalities over the past two hundred years. More recently, the average annual cost of flood damage is estimated to be $314 million (Geoscience Australia, 2007) while insurance claims for the 2010/11 summer floods in Queensland, New South Wales and Victoria are in excess of $2 billion.

Flash floods can occur almost anywhere in Australia, and result from a relatively short period of intense rainfall. In such events, drainage systems may be unable to cope and large amounts of water may flow in localized but unpredictable ways. Riverine floods occur in relatively low-lying areas adjacent to streams and rivers. In the flat inland regions of Australia, floods may spread over thousands of hectares and last several weeks. The 2010/11 summer floods were a combination of flash and riverine flooding.

The impact of flood damage can be reduced over time through planning controls and building standards informed by a better understanding of the risks. In the short term, the risk to property can be mitigated by improved drainage systems and local protective measures. The risk to people can be greatly reduced through early warning, and if necessary by evacuation to safer areas.

Bushfires

Bushfires are a natural part of Australia's environment. The natural ecosystems have adapted to bushfire, while the diversity of the landscape has been shaped by fire for millennia. Fire has been harnessed to clear land for agricultural purposes and to reduce risk to property from intense uncontrolled bushfires.

Uncontrolled fires can cause casualties and great damage, such as the Ash Wednesday fires in Victoria and South Australia in 1983, and the Black Saturday bushfires in Victoria in 2009. Although images of uncontrolled bushfires generate fear and promote a strong political response, overall they cause much less damage than flooding and cyclones - mainly because bushfires tend to occur outside the cities, in areas with fewer people and buildings.

Bushfires also differ from other natural hazards as the risk can be mitigated by reducing human ignitions by community education, and through the early suppression of local fires.

Importantly, the early warning of approaching fires can enable the timely evacuation of people from potentially hazardous areas.

Tropical cyclones

Tropical cyclones are entrenched in the cultures of indigenous people throughout the northern half of the continent and historical records show over 2,100 people have lost their lives to tropical cyclones over the past two hundred years. (Geoscience Australia, 2007)

Tropical cyclones bring destructive winds, torrential rains, storm tides and violent seas causing massive damage to homes, commercial properties and regional infrastructure. The immediate impact of tropical cyclones are usually on the coast – where most people live – but the effects can be felt well beyond the tropics and away from coasts if they interact with other weather systems inland.

Satellite imagery has increased our ability to track tropical cyclones off the coast of Australia, and advances in computer modelling have increased our ability to predict where and when they will hit the coast and travel inland. Early warnings can greatly reduce the risk of harm to people in the path of an advancing cyclone.

Geological hazards

Compared with regional neighbours such as New Zealand, Papua New Guinea and Indonesia, the Australian continent is relatively geologically-stable and is less prone to geological hazards such as earthquakes, tsunamis, landslides and volcanoes.

Moderate-sized earthquakes, however, have caused substantial losses. In December 1989, an earthquake near Newcastle killed 13 people and caused over $4 billion damage to buildings, the utilities and critical infrastructure in New South Wales.

Tsunamis (seismic sea waves), despite being rare in Australia, have impacted on our coastlines. Serious damage was caused in 1960 along the eastern seaboard and in 1977 and 1994 along the north-west coast from distant earthquakes.

Landslides occur regularly in Australia, although their impact tends to be localised and far smaller in scale than other disruptive events. More than half of the landslides can be attributed directly or indirectly to human behaviour. Like floods, the cost of damage can be reduced over time through planning controls informed by a better understanding of the risks.

Earthquakes, and landslides happen with little warning, and there is usually insufficient time to warn people. Although it may be possible to warn communities of a tsunami, it is difficult to provide accurate information on where it will strike land.

2.1.2 Technological hazards

Events such as nuclear contamination from the Fukushima power plants in 2011, the oil spill from BP's Deepwater Horizon accident in 2010, or the leak of methyl isocyanate gas from the Bhopal chemical plant in India in 1984, demonstrate the threat to people, property and the environment from technological hazards. This category of threats, sometimes referred to as man-made or human-made disasters, is expected to increase in terms of its immediate and longer term impact on society.

Australia has experienced a number of disruptive events from technological hazards, albeit not in the scale of Fukushima, Deepwater Horizon, or Bhopal. On 21 August 1991, a storage tank on Coode Island containing 8.5 million litres of toxic chemicals exploded, and the resulting toxic plume threatened the metropolitan area of Melbourne; on 9 May 2006, an uncontrolled detonation in an explosives store at Gladstone in South Australia led to

substantial damage; and on 24 August 2009, an incident with the West Atlas Offshore drilling rig, 250 kilometres north of Truscott, led to a major release of oil.

Australia needs to be prepared to cope with much larger technological disasters, and have the ability to warn people at immediate risk from the resulting fire, explosions or toxic plumes. (JF)

2.1.3 Malicious attacks

On 4 December 2008, then Prime Minister Rudd defined the security of Australia and its people in a broad sense to include malicious attacks from armed groups and criminal organisations as well as foreign states. Such non-traditional threats include attacks on public utilities, transportation and economic targets using a range of means including high explosives, chemical, biological or nuclear weapons, and cyber attacks.

The impact of such attacks could be just as great as that from natural or technological hazards. If possible and appropriate, people should be warned of such attacks, and advised on how to reduce the likelihood and impact of harm.

2.2 Society's Expectations

Perhaps the greatest challenge facing governments, organisations and communities today is satisfying society's needs and expectations in the event of a disaster, or indeed the fear of future disasters. Robert Putman, in his influential book *Bowling Alone* (2000) observed a lack of civil engagement in America which has undermined community and organisational identity and cohesion, which in turn has reduced the nation's ability and willingness to recover after confronting disruptive events. In his book *Disconnected* (2010), Andrew Leigh – a member of Parliament for the Canberra seat of Fraser – notes similar trends in Australia.

Over the past few decades we have benefitted greatly from improvements to our safety and occupational health, and we look to our governments and others in authority to mitigate threats and reduce risks. We demand information to assist us in reducing the likelihood and consequences of a disruptive event, and we expect support to help us recover as quickly and completely as possible.

Communications' systems such as EA aim to meet society's growing demand to be informed on the risk from current or impending threats, and to promote appropriate actions.

2.3 Shared Responsibilities and Obligations

The Australian Constitution requires the governments of states and territories to protect lives, seeking assistance as required from the Commonwealth Government. The governments' responsibilities for disaster planning and preparation, and response and recovery actions have recently been clarified and are listed in *The National Strategy for Disaster Resilience*.[2]

The National Strategy promotes a shared responsibility, but notes that "shared responsibility does not mean equal responsibility ... there are some areas in which the state should assume greater responsibility than the community ... For Australia to become more resilient to disasters, we need a clearer understanding of our risks, and what to do about them. Information on disaster risk should be communicated in a manner that is appropriate to its audiences, and should consider the different needs, interests and technology used within communities ... While work is being progressed in relation to warning systems and new technologies for communicating timely messages when disaster strikes, more needs to be done so that communities receive and interpret information and take action" (Pages 3, 9 and 13).

The provision of clear, accurate and timely public information is an essential part of disaster preparedness. Governments have an obligation to educate society on future threats which may cause harm, loss or distress. People should be told when general threats become specific risks, and be advised on actions to reduce the likelihood and impact of potential harm. Individuals and communities need and expect to be warned of immediate danger – what is the threat, when will it happen, and how bad will it be. Public information and warnings should provide people with facts and advice, and enable individuals, communities and organisations to make informed decisions.

In practice, people receive facts and advice from a number of sources in addition to formal public information. Newspapers, 24 hour television news, the internet and mobile phones provide information which may be incomplete and sometimes contradictory. As people interpret and act upon warning messages differently, their perception of risk may be quite different from the actual likelihood and severity of harm.

2.4 The Requirement for Alerts and Warnings

In June 2009, OESC published a guide and reference document to assist individuals and organisations involved in the design, development, introduction and use of EA. The *Nationally Consistent Emergency Warning System Reference Document* details the high-level requirements for an emergency warning system in Australia. The document explains the process and activities which led the procurement of a telephony-based system, specifies the operational requirement, and outlines the governance arrangements and protocols for its use.

The document notes that “every analysis of past emergencies and disasters points to communications as a limiting factor in disaster response .... (and improved communication) is an area where government and the emergency services can use technology to great advantage in getting information to the public.” (Section 2, Page 6)

National guidelines on the use of the EA system were issued in November 2009 by OESC following consultation with states and territories. The *National Telephony Warning System Guidelines* provide “a framework, the principles and the legislative base for jurisdictions to develop compatible and consistent protocols to operationalise the system .... (and) .... to provide a consistent telephony-based warning methodology for emergency services in each state and territory that will: integrate the telephony warning system with current emergency management practices .... (and will) .... enable jurisdictions to align hazard specific warnings with the telephony warning system.” (Section 2, Pages 5 and 6)

The guidelines include a number of conditions required for the EA system to be effective. (Section 5, Page 7) These include *inter alia*:

a. A high level of commitment from, and collaboration across, governments;

b. Appropriate community awareness and education programs are in place for EA systems;

c. The community is willing to act on the advice provided in the warnings;

d. Sound and timely intelligence is available to inform the decision-making process; and

e. The EA system should be just one of a number of media used to disseminate warnings.

These key requirements provide the benchmark against which comments on EA were considered and evaluated.

PART THREE: EVALUATION METHODOLOGY

3.1 Literature Review and Scoping Study

The study reviewed a number of key documents which informed the requirement, design, development, introduction and subsequent use of EA. The purpose of the literature review was to understand the historical context of the program, and to inform the data collection and subsequent analysis. A summary of the literature review and findings is at Appendix 2.

A key finding of the literature review is that **warning messages must be seen as part of a broader program of public awareness** and community education of potential threats, emergency/disaster preparedness, and informing people of immediate danger. EA is just one of a number of means of providing people with the information they need and expect, prior to and during a disruptive event.

The scoping study identified the key stakeholders, i.e. the people, groups and organisations who have an interest in the system's ability to deliver effective warning messages in a timely manner. The stakeholders fall into two groups: those who 'own' and operate EA, and those who receive EA messages by landline or mobile.

3.2 Pilot EA Evaluation

A pilot evaluation was conducted in Victoria to trial the methods of collecting and analysing data. The pilot involved meetings with the operators of EA in Victoria, and telephone interviews with a sample of people who had received one or more EA messages over the previous six months.

OESC nominated key staff to be interviewed from the Department of Sustainability and Environment, Victoria Police, Metropolitan Fire and Emergency Services Board, Country Fire Authority and State Emergency Service. The sessions took the form of semi-structured interviews based on three key questions agreed in advance.

a. What are the ideal capabilities of an ideal alert system, and how would these ideal capabilities contribute to the users' role in emergencies and disasters?

b. What were the users' expectations of Version 1 of EA as delivered on 1 December 2009, recognising the constraints of time and cost, and the need to integrate the system into legacy programs, procedures and processes?

c. How satisfied were the users with Versions 1 and 2 of EA, and what further enhancements are needed?

OESC selected six areas to be surveyed: Charlton, Creswick, Horsham, Kerang, Koo Wee Rup, and Rochester. These areas represented a cross-section of the towns, homes and livelihoods affected by the floods across Victoria in January and early February 2011.

The pilot provided useful lessons on the format, content and use of the telephone survey. Some changes were made to the questionnaire and its use in the remaining states and territories. The results of the pilot form part of the overall findings of the national evaluation.

3.3 EA Evaluation of Other States and Territories

3.3.1 Interviews with the 'owners' and operators of EA

States and territories (other than WA) each nominated key staff to discuss the use of EA in their jurisdiction. Interviewees were invited to indicate the effectiveness of the overall system

and procedures for generating and issuing warnings in their own state or territory. This was achieved by 'scoring' each of the seven elements of a warning system as identified in the *National Telephony Warning System Guidelines*: (1) community preparedness; (2) situational awareness and analysis; (3) decision-making and authorisation; (4) message construction and dissemination; (5) management of warning consequences; (6) real-time monitoring; and (7) real-time closure. Guidance used to 'score' the seven elements is at Appendix 3.

Findings from the interviews are in Part Four of this report.

3.3.2 Survey of households' expectations

Telephone surveys of 900 households were conducted in states and territories which had recently used EA in Queensland, New South Wales, South Australia and the Northern Territory, in addition to the 600 households surveyed in the pilot evaluation. The questionnaire used for the surveys is at Appendix 4.

Participants were screened to ensure they had received an EA message. Those who had not were asked questions on their awareness and understanding of EA and their preparedness for an emergency. No quotas were placed on age or gender. Results from the total sample of 1,600 interviews provide a margin of error of +/- 4% at 95% confidence.

Findings from the surveys are in Part Four of the report.

PART FOUR: FINDINGS

4.1 User Consultation Findings

4.1.1 System within a system

Many of the users referred to EA as a system within a system, and **the need to strengthen all seven elements of the overall system** for generating and issuing warnings within their own state or territory – in order to maximise the effectiveness of EA.

Users were invited to 'score' all seven elements. A score of 5 indicates that current systems, processes and documented procedures are comprehensive, complete and understood by agencies; they have been applied in an operational setting and have proved to work well; and there is an ongoing need to review the systems, processes and procedures. A score of 1 indicates that current systems, processes and documented procedures are completely inadequate.

A full description of the scoring system is at Appendix 3. The results from 20 users representing all the states and territories, less WA, are summarised in Table 1.

Element	Score					
	5	4	3	2	1	Mean
(1) Community preparedness	-	11%	50%	33%	6%	2.7
(2) Situational awareness and analysis	6%	55%	33%	6%	-	3.6
(3) Decision making and authorisation	-	44%	44%	12%	-	3.3
(4) EA message construction and dissemination	6%	44%	33%	17%	-	3.4
(5) Management of warning consequences	6%	22%	56%	6%	-	3.2
(6) Real-time monitoring of emergency	-	32%	56%	12%	-	3.2
(7) Real-time closure of emergency	6%	22%	50%	22%	-	3.1

Table 1: Effectiveness of systems for generating and sending warnings

4.1.2 Community preparedness

Although the emergency services can provide information and warnings to communities at risk, the overall success of EA will be determined by the communities' ability to act on a warning. Users indicated that **community preparedness was the weakest part of the overall warning system**. A mean score of 2.7 suggests that some systems, processes and documented procedures are incomplete, there are some critical limitations, and there is a need for further development and improvement. Issues of particular concern are the need to 'localise' EA education , the need to make young people, foreign students and visitors more aware of EA, and the need for such groups to have plans in place to react appropriately to a warning message.

Users also suggested that rural communities are more aware of potential threats, and are better prepared to act on EA messages. Conversely, there was a feeling that **urban communities are less informed**, and may be less disposed to act on EA messages. This difference in the perception of risk between urban and rural communities reinforces the findings of a survey conducted for OESC in November 2009 and February 2010 on the awareness and understanding of EA in Victoria, and the level of preparedness for emergencies.[3]

Although community preparedness programs advise households to have at least one phone in each house which is not dependent on mains electricity, **users expressed concerns that many properties do not have such phones**. Recent experience in New Zealand and Japan showed that large numbers of people did not receive warning messages because underground power cables were cut. These concerns, however, were not confirmed by the responses provided in the household survey (see 4.2.2) where 95% reported they have at least one phone in their house which is not dependent on mains power.

4.1.3 Situational awareness

Providing the agencies with comprehensive, accurate and current information, and the tools to model how risks will develop over time, is an essential part of situational awareness. Better situational awareness will improve the quality of decisions and the content of EA warning messages. A mean score of 3.6 suggests that **most of the systems, processes and documented procedures have been developed and applied in an operational setting, or practiced in field/desk exercises and are appropriate.** Users suggested there is scope for some further improvement such as the development of better models to predict the impact of flash flooding.

4.1.4 Decision making

The processes for making decisions on how and when to warn communities at risk should be included in protocols prepared by each jurisdiction, and records should be maintained of all key decisions taken. A mean score of 3.3 suggests that **appropriate decision-making processes have been developed and are available**, and there are no critical limitations. But users suggested there is scope for improved training (see 4.1.9 below) of decision makers in a realistic exercise setting, particularly by states and territories which have yet to use EA operationally.

4.1.5 EA message development and delivery

EA warnings are intended to achieve two distinct outcomes: to inform the community of a current or impending threat, and to promote appropriate actions. Systems and procedures should be available and understood on how best to integrate EA messages with other media including radio, TV, official websites, social networking and RSS feeds. The aim is to provide people with complementary and consistent information in a timely manner to enable them to make informed decisions.

A mean score of 3.4 confirms that EA achieves its purpose. From the users' perspective, EA is considered to be an effective system for sending warning messages which aim to inform people of potential risks, and direct them to appropriate media. As one person observed, "it does exactly what it says on the can." There is **overall satisfaction with the current system of message development and delivery, and users have confidence in its future development.**

The need to send alert messages to mobile phones based on the location of a handset was raised by the users, and all were satisfied that progress towards realising this capability is being made.

Users commented that mobile phones are becoming more 'intelligent' and in the future it may be possible to link incoming EA alerts automatically with additional information. The emergency services and other agencies issuing EA messages will need to consider carefully how such additional information can be used to assist people during an emergency, and not to overload them at a time when brevity, clarity and simplicity may be more important.

4.1.6 Warning consequences

In preparing and sending EA messages (together with other media), agencies should consider the likely community response to their messages. A mean score of 3.2 suggests that **appropriate procedures for predicting the consequence of EA warnings have been developed and are available**, however some users indicated the need to better predict much better the consequences of warnings – the consequential **impact on other systems** such as websites, mobile phone congestion, triple zero emergency calls and traffic management in an emergency. Rumours created through social media is an area of concern, as is how best to counter such rumours.

4.1.7 Monitoring

Agencies should monitor in real time the community's response to each EA warning message and information provided by other media. This information will assist the situational awareness of the emergency services, and help inform the detail and timing of follow-on EA messages and/or other media. A mean score of 3.2 suggests there is **significant room for improving monitoring**. This was reinforced by a comment from one jurisdiction which stated that it's ability to monitor the community's response "may be under-resourced in a major incident."

4.1.8 Closure

The issue of **real-time closure of a disruptive event was raised by users as a problem**, especially in a developing campaign where a series of EA messages may have been sent. Often, events will not impact on some households which receive warning messages, and people need to be informed that they are no longer at risk. This may become a greater problem in the future as social media becomes more commonly used, and EA messages are updated or even contradicted by informal sources of information.

4.1.9 Training

The only criticism from users of Version 1 was the lack of a full training system when EA became operational on 1 December 2009. This limitation was soon corrected and had no impact on the operational use of EA in any of the states or territories. There was a demand from the users for **more sharing of lessons learned** and **new ideas on how to better exploit the EA system** in all the states and territories. One jurisdiction that has yet to use EA operationally said they would welcome an extended visit by an experienced user.

4.1.10 Other media

There was considerable discussion on the role of systems such as Victoria's One Source One Message (OSOM) and its relationship with EA. The majority (but not everyone) indicated strongly there was a **need to improve the way in which information was provided using various media**: radio, TV, official websites, social networking, and RSS feeds as well as EA messages via fixed line and mobile telephones. The development of a Common Alerting Protocol should enable a consistent warning message to be disseminated simultaneously using different media.[4]

4.1.10 Other uses of EA

There were mixed views from users on whether the EA 'infrastructure' should be used in a much broader way to address day-to-day challenges, or to use it only as originally intended, i.e. to warn of potential harm to the community. To some extent, the use of EA to warn of missing persons is an extension of the original purpose of the system.

The conditions for using the Integrated Public Number Database (IPND) - which provides the telephone numbers used by EA – currently limit the way in which EA can be used. *The Telecommunications Act 1997 (Commonwealth)* requires that IPND information be used only for alerting people of an emergency, or likely emergency, and for testing the EA system.

EA provides a unique and powerful means of providing intrusive and targeted messages. As phones become more 'intelligent' it may be possible to use EA as a means of informing the public of potential harm which falls short of an 'emergency'. The possible use of EA in such circumstances should be routinely reviewed by the EA Steering Committee by drawing on the experience of other warning systems in other countries, while noting that such use could 'desensitise' people to the importance and urgency of EA messages.

4.2 Household Survey Findings

4.2.1 Profile of participants

Age group	
18-24 years	2%
25-34 years	9%
35-44 years	20%
45-54 years	24%
55-64 years	22%
65-74 years	15%
75+ years	8%

0.3% refused to provide age

Main language	
English	99%
Other	1%
Household disability	
Yes / No	6% / 94%
Gender	
Male	33%
Female	67%

4.2.2 Were messages successfully received?

a. At least 83% of people recall receiving an EA warning message.

   Comment: This high figure suggests the telephone numbers used in the survey correspond closely with the numbers supplied to the EA system by the national IPND. This correlation provides confidence that the information collected in the survey is an accurate sample of the total number of messages sent by the EA system.

b. 43% of households who recalled receiving an EA message received the warning on their landline phone and a further 33% on their answerphone – a total of 76%. A further 71% recall receiving SMS messages on their mobile phone.

   Comment: Over half of those contacted received messages on landline and mobile.

c. 78% of people said that landline phones are a 'convenient or very convenient' method of receiving warning messages. 78% also said that mobile phones are 'convenient or very convenient'.

   Comment: The acceptability and preference for receiving messages on mobile phones is likely to increase once the EA system is able to use the actual location of mobile phone users as warning messages will be sent to mobile phones being used by people in areas at risk.

d. 95% of people said they had at least one landline phone which was not dependent on mains power, and the phone was always connected. (This question was added after the pilot evaluation in Victoria.)

Comment: This is a surprisingly high figure as reports from the 2011 disasters in Fukushima, Japan and Christchurch, New Zealand state that large numbers of people did not receive telephone warning messages on their landmine phones because underground power cables were cut.

4.2.3 Were the messages clear and complete?

a. 98% of people received the message in full and 97% said the message was clear.

b. Only 31% of people recall the sender or source of the message as being the SES or the 'emergency services'. 24% thought the message came from the government, shire council, CFA/CFS, Telstra or other sources. 49% did not know, or were unsure, who sent the message.

   Comment: The number of people who can recall the sender or source of the message is less than those surveyed in EA test messages issued by the states and territories. This may be because the surveys took place immediately after the tests, or that in a real situation people are more interested in the call to action than recalling the sender or source of the message.

c. 8% of the recipients said they were concerned, 10% said they were worried, and 14% said they were shocked or even panicked by the message, whereas 40% said they were reassured, relieved or comfortable. The remainder expressed no strong feelings.

   Comment: This result is not surprising given the context and content of the messages, i.e. an imminent flood and the possibility of harm to people, property and possessions. It suggests the message created a sense of urgency.

d. The time of day the warning was sent to households did not appear to affect the clarity or completeness of the message, or people's response.

4.2.4 What was the call to action?

a. 22% of people recall being told to evacuate, with 38% being told to put a plan into action/get ready or be prepared to act. 15% said they were told to take no action, or that no action was required. 9% recall the message as advising them to seek further information. 16% took no notice, or could not remember any call to action.

b. On receiving the message, 14% of people immediately moved away from the danger area or began to implement an emergency response plan. A further 34% talked to family, neighbours and/or friends about taking action, or sought further information. 29% said they did nothing or 'went back to bed'.

   Comment: The actions taken by people depend on the content of the message – whether people are being informed, warned, or instructed to act in some way. A key finding of the survey is that most people understood the warning message and its intent.

4.2.5 Were sources of additional information given?

a. Having received a warning message, 87% of people said they would seek further information from neighbours, friends and/or family; 73% would seek information from local radio stations; and 81% said they would follow the instructions in the message. Only 6% said they would not seek further information.

Comment: The wish to contact neighbours, friends and families to seek and share further information supports the findings of earlier surveys, and suggests a strong sense of community spirit and local trust.

b. In seeking further information, women were: (1) more likely than men to contact neighbours, friends and families (89% vs 80%), and (2) more likely than men to follow the instructions in the message (84% vs 72%).

Comment: This suggests that targeted community education is needed to encourage men to seek further information on receiving a warning message.

4.2.6 Were expectations met?

a. On being asked whether EA met their expectations:

84% said it fully met or exceeded their expectations; the range of responses was from 68% to 94%.

13% said it did not meet their expectations; the greatest dissatisfaction was 24%

b. Of the 13% who indicated dissatisfaction:

44% said the message was inaccurate or failed to provide appropriate information, i.e. 6% of the total;

35% said the message arrived too late or too early, i.e. 5% of the total;

22% said the message was not applicable, i.e. 3% of the total;

21% said the message made people panic/was exaggerated, i.e. 3% of the total;

8% said the message was unclear, i.e. 1% of the total.

4.2.7 Awareness and preparedness

In addition to the above five questions, people who did not receive a warning message were invited to comment on their general awareness of EA and their preparedness for an emergency event.

a. 75% of people said they were aware of the EA system.

Comment: This is similar to the level of awareness in the immediate aftermath of the national EA community education program in late 2009 and early 2010.

b. 70% of people said they were prepared or very prepared for an emergency event; 21% were not very prepared; and 8% were not at all prepared.

Comment: This lack of preparedness is consistent with the views expressed by the users of EA (see 4.1.2) that there is a need to place even greater emphasis on community education and preparedness in areas prone to extreme weather events, bushfires and other natural hazards.

4.2.8 Detailed findings

The detailed findings, showing results for each of the 15 areas surveyed are given in a separate stand-alone document: *Evaluation of EA: Household Survey – Detailed Findings.*

4.3 Conclusions

4.3.1 User consultations

From the users' perspective, EA is considered to be an effective system for sending warning messages which aim to inform people of potential risks, and directs them to appropriate media.

Many of the users referred to EA as a system within a system, and the need to strengthen all seven elements of the overall system for generating and issuing warnings within their own state or territory – in order to maximise the effectiveness of EA.

Community preparedness is considered as the weakest part of the overall warning system. Issues of particular concern are the need to 'localise' EA education, the need to make families having recently arrived in Australia, international students and indeed young people generally, more aware of EA, and the need for such groups to have plans in place to react appropriately to a warning message.

There is a need to improve the way in which information is provided using various media: radio, TV, official websites, social networking and RSS feeds, in addition to EA messages via fixed line and mobile phones. The development of a Common Alerting Protocol should enable a consistent warning message to be disseminated simultaneously using different media.

The issue of real-time closure is considered a problem, especially in a developing campaign where a series of EA messages may have been sent. This may become a greater problem in the future as social media becomes more commonly used, and EA messages are updated or even contradicted by informal sources of information.

There is a demand for more sharing of lessons learned and new ideas on how to better exploit EA.

EA provides a unique and powerful means of providing intrusive and targeted messages. As phones become more 'intelligent' it may be possible to use EA as a means of informing the public of potential harm which falls short of an 'emergency'. The possible use of EA in such circumstances should be routinely reviewed by the EA Steering Committee by drawing on the experience of other warning systems in other countries, while noting that such use could 'desensitise' people to the importance and urgency of EA messages.

4.3.2 Household survey

Households are generally satisfied with the delivery and content of EA warning messages. The survey shows the system provides most people with most of the information they need and expect.

- 83% of the people received messages;
- of those who received messages, 98% said the message was delivered in full and 97% said the message was clear;
- 84% of the people understood and acted upon the warning message;
- on receiving the message, nearly 87% of the people said they would seek further information; and
- 84% said EA fully met or exceeded their expectations.

Women are more likely than men to contact neighbours, friends and families (89% vs 80%), and are more likely than men to follow the instructions in the EA warning message (84% vs

72%). Targeted community education is needed to encourage men to seek further information, and to act on the information given in EA warning messages.

25% of people said they were not aware of EA, and 29% of people said they were not sufficiently prepared for an emergency event. There is a need to place even greater emphasis on community education and preparedness in areas prone to extreme weather events, bushfires and other natural hazards.

GLOSSARY OF TERMS AND DEFINITIONS

Accident	an undesired event which results in harm
AGD	Attorney-General's Department
CATI	Computer-Aided Telephone Interviewing
COAG	Council of Australian Governments
Community	a group of people with a commonality of association and generally defined by location, shared experience or function. In this study the term community refers to a group of people from a common location.
Disaster	a condition or situation of significant destruction, disruption and/or distress to a community.
Disruptive event	an unwanted situation which has the potential to become an emergency or even a disaster.
EA	Emergency Alert: the system (equipment, software, protocols and procedures) developed for the Government of Victoria on behalf of COAG.
Emergency	an event, actual or imminent, which endangers or threatens to endanger life, property or the environment, and which requires a significant and coordinated response.
EWSWG	Emergency Warning Systems Working Group
Event	occurrence or change of a particular set of circumstances; an event can sometimes be referred to as an "incident" or "accident". an event without consequences can also be referred to as a "near miss", "incident", "near hit" or "close call".
Incident	an event that gives rise to an accident or has the potential to lead to an accident.
IPND	Integrated Public Number Database
LBNS	Location Based Number Store
MCPEM-EM	Ministerial Council for Police and Emergency Management – Emergency Management
NEMC	National Emergency Management Committee
NEMP	National Emergency Management Project
OESC	Office of the Emergency Service Commissioner, Victoria
Resilience	the ability of something or someone to recover and return to normality after confronting an abnormal, alarming and often unexpected threat. It suggests an ability to accommodate the unexpected, to adapt, to engage and recover from disruptive events, and in some cases to become stronger as a result of the experience.

Risk	effect of uncertainty on objectives; risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the likelihood of occurrence.
Threat	an act by someone or something which aims to cause harm, loss and/or pain in a manner considered to be menacing
Warning	a message which aims to inform people of an impending or current threat and/or to promote appropriate actions. (National Telephony Warning System Guidelines)

SUMMARY OF LITERATURE REVIEW

This review of key documents informed the requirement, design, development, introduction and subsequent use of EA. The findings of the literature review provided the historical context of the program, and informed the collection and subsequent analysis of the data.

Nationally Consistent Emergency Warning System Reference Document

In June 2009, OESC published a guide and reference document to assist individuals and organisations involved in the design, development, introduction and use of EA. The *Nationally Consistent Emergency Warning System Reference Document* details the history and high-level requirements for an emergency warning system to be used in Victoria and in other states and territories as agreed by COAG. The document explains the process and activities which led the procurement of a telephony-based system, specifies the operational requirement, and outlines the governance arrangements and protocols for its use.

The document notes that ".... every analysis of past emergencies and disasters points to communications as a limiting factor in disaster response .... (and improved communication) is an area where government and the emergency services can use technology to great advantage in getting information to the public."

The document describes the role of the Emergency Warning Systems Working Group (EWSWG) which was established in May 2008 by AGD on behalf of the Ministerial Council for Police and Emergency Management – Emergency Management (MCPEM-EM). In September 2008, in its report to the MCPEM-EM, EWSWG concluded that ".... in the event of a disaster or emergency and/or in the interest of public safety, a nationally consistent community/public emergency warning system would facilitate the timely, reliable and immediate delivery of mass targeted or focused emergency warnings and time critical information to prevent the loss of life and property, enable appropriate community preparedness, effective emergency service response and appropriate recovery."

COAG considered the report and directed that tasks recommended by EWSWG be completed by the end of 2008, including access to the Integrated Public Number Database (IPND). IPND is a national database which contains information on all phone numbers, households, telecommunications carriers and carriage service providers. Although Telstra manages the IPND on behalf of the Commonwealth Government, it is only authorised to access the database for 'approved purposes' as defined in the *Telecommunications Act 1997*.

Victoria, represented by OESC, was requested to review the technology options. The review aimed to establish: (1) technologies currently available; (2) emerging technologies; (3) other telephony-based warning systems in use in other countries; (4) providers, other than the telecommunications carriers, who could provide a solution; and (5) alternatives in the event that the national telecommunications network was impacted by a disruptive event.

The work undertaken by OESC aimed to ".... provide a technical infrastructure and application layer to be utilised for emergency warning across the state of Victoria or across the entire country." The *Nationally Consistent Emergency Warning System Reference Document* describes the outcome of this work. As such, the document represents the primary reference for the evaluation project.

Section 5 of the document describes the telephony-based solution. Section 6 discusses the governance arrangements. Section 7 proposes operational protocols. Section 8 describes

the community awareness campaign needed to support the introduction of the proposed system. Section 9 provides the requirements specification for the system.

CIWS Trial and Evaluation report

In 2005, the OESC in Victoria, in partnership with Telstra, ABC Radio, the emergency services and the Shires of Yarra Ranges and Northern Grampians trialled and evaluated a system known as the Community Information and Warning System (CIWS). CIWS had been developed by Telstra as a concept demonstrator to ".... evaluate the responses and behaviour of communities to a public emergency warning system which integrates innovative telecommunication and data transfer technology with public warning procedures and GIS mapping operations."

The report, which was published in early 2006, addressed the effectiveness of the technology used in the trial, summarised the lessons learned by local authorities, the emergency services and ABC Radio, and assessed the benefits to communities who received warning messages.

The trial confirmed the suitability of commercial off-the-shelf technology and the integration of such technology into the CIWS

The CIWS trial and evaluation report stressed the need for telephone warnings to be preceded by an effective community education program. The report concluded that people who are well prepared and have a realistic perception of risk are more likely to use telephone warning messages to trigger appropriate decisions and behaviour; and that people with limited understanding and awareness are more likely to be wholly dependent on telephone warnings. Indeed, in such circumstances, rather than triggering appropriate and informed decision making, telephone messages are ".... more likely to become a source of information which could increase (people's) uncertainty, lack of preparedness and reduce their ability to (act in a safe and appropriate manner)."

Report to US Congress on All-Hazard Warnings

On 30 September 2009, the US Government Accountability Office (GAO) submitted a report to the US Government on the development of an Integrated Public Alert and Warning System (IPAWS). The GAO report provides a useful summary of the actions being taken by the US to establish an improved, national-level warning system.

The Emergency Alert System (EAS) is the primary national-level public warning system in the US. It is built on a structure conceived in the 1950s when public radio broadcasting was the best available technology for disseminating emergency alerts widely. FEMA administers the current EAS and is responsible for developing a new IPAWS.

IPAWS is described as a system of systems which will integrate the existing EAS with a proposed Commercial Mobile Alert System (CMAS) and National Weather Radio which currently broadcasts weather-related warnings. State and local governments are developing and deploying their own alert systems which FEMA intends to integrate into IPAWS.

The GAO report is highly critical on the progress being made with IPAWS. It states that the vision of IPAWS has changed twice, and there is no implementation plan. Many of its intended capabilities such as distributing messages to pre-defined geographical areas through redundant pathways have yet to be achieved. The report states that ".... FEMA conducted a series of pilot projects without systematically assessing outcomes or lessons learned and without substantially advancing alert and warning systems. The report concludes that ".... FEMA has made limited progress in implementing a comprehensive, integrated alert system (and consequently) states have forged ahead and invested in their own alert and warning systems."

The GAO report highlights the political, organisational, technical and conceptual challenges which have prevented the US Government from developing a comprehensive all-hazards warning system. The US and other governments acknowledge there are no 'silver bullets' and therefore the evaluation of the EA system in Australia cannot be benchmarked against an ideal warning system. No such ideal system exists.

Developing Early Warning Systems: a Checklist

In January 2005, the World Conference on Disaster Reduction adopted the *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters.* The framework included the need to develop improved ".... warning systems that are people-centred and deliver warnings that are timely and understandable to those at risk .... including guidance on how to act upon warnings."

An international conference held in Bonn from 27-29 March 2006 produced *Developing Early Warning Systems: a Checklist* to address the early warning component of the Hyogo framework. Actions included in the checklist are grouped into four key elements: understanding risks and vulnerabilities; developing hazard monitoring and early warning services; communicating risk information and early warnings; and building national and community response capabilities.

The document states that ".... clear messages containing simple, useful information are critical to enable proper responses that will help safeguard lives and communities. The use of multiple communication channels is necessary to ensure as many people as possible are warned, to avoid failure of any one channel, and to reinforce the warning message." The document stresses that ".... communities must understand their risks; respect the warning service and know how to react. Education and preparedness programs play a key role."

2009 Victorian Bushfires Royal Commission

On 31 July 2010, the Royal Commission published its report on the 2009 Victorian bushfire disaster. The final report makes reference to the need to improve warning systems and the importance of issuing warning messages in a timely manner. The report emphasises that such systems and messages must not be considered in isolation, but as part of a community education program which alerts the public to the dangers from fire and describes the options available to individuals, families and neighbourhoods to Prepare, Stay and Defend, or Leave Early.

The report suggests that communities and individuals need specific information and advice before, during and after the fire, and that warnings should be made using "....every available means, embracing new initiatives and technology and through local arrangements such as sirens where they are favoured." (Volume 2, section 1.9.1)

Faced with a bushfire threat, some people will leave early, others will be intent on staying to defend their home, and many will decide whether and when to leave on the basis of triggers that might be specific to their individual circumstances and location. Timely and accurate warnings can provide such triggers, but the content and delivery must be carefully developed to elicit the right response. (Volume 2, section 1.8.2)

The report noted that ".... even when people receive warnings, there is no guarantee they will act in a manner intended. The Commission was told of individuals who, despite explicit warnings on 7 February of the dangers they faced and in some cases their unlikely ability to defend, refused to leave their homes. Some of these people died. Nevertheless, greatly improving warnings is one of the fundamental ways the State can increase people's chances of surviving a bushfire. (Volume 2, section 1.9.1)

The report notes that fire and smoke in some cases reduced the effectiveness of telecommunications, which in turn impacts on systems available to the emergency management command and control, and for public warnings. The report suggests that research is required to assess the resilience of such systems. (Summary page 20)

The Commission concluded there were serious problems with the timing, content and delivery of warnings on 7 February 2009, but noted that much has been done to redress these shortcomings, including the introduction of the EA system.

A National Systems Approach to Community Warnings

The Australian Fire and Emergency Service Authorities Council (AFAC) discussion paper of September 2009 (which was written in early 2009 and therefore does not draw on the findings or recommendations of the Victorian Bushfires Royal Commission report) proposes that community warnings are much more than a telecommunications issue. It promotes a systems approach based "... on a range of integrated elements, underpinned by community survivability strategies."

(1) Preparing the community. The paper states that ".... the most crucial aspect of a warnings system is the continued development of community survivability strategies that are in place well before any emergency event occurs." In preparing the communities through education, engagement, practice and reinforcement, people will be better able to interpret warning messages, and be ready to take appropriate action when an emergency occurs, even in the absence of any official warnings. But the paper acknowledges that community preparedness ".... represents a significant challenge given the remote, diverse and multicultural profile of Australia." (Page 9).

(2) Situational awareness. The paper notes that in a fast-moving, highly dynamic emergency the value of hazard-specific, real-time intelligence and situational awareness at both the agency and the individual level is crucial. It suggests that a gap exists in the intelligence and situational awareness tools, and that agencies have embarked on developing their own modelling tools, while others are awaiting the outcome of the Victorian Bushfires Royal Commission report. (Page 11)

(3) Message construction and dissemination. The report suggests that ".... without a common description of the underlying terminology with which communities are familiar, warning messages from different media will be confusing to the public and inefficient to deliver" and recommends ".... a standards-based, all media, all-hazards public warning strategic framework (to provide) a more effective solution and more efficient use of resources." (Page 13)

(4) Taking appropriate action. While emergency services aim to provide timely, relevant and accurate warnings, the report notes that it will not always be possible for messages to be sent and received before protective action is needed. It stresses the importance of community education ".... in building higher levels of household preparation and higher levels of adoption of more appropriate protective action." (Page 20)

These four elements are reflected in the Victorian Warning Protocol of November 2009. The Protocol will be used a primary reference in the EA evaluation's pilot study to be conducted in Victoria.

Emergency Warnings: Choosing your Words

Edition 2 of *Emergency Warnings: Choosing your Words* provides guidance on writing effective messages. It was prepared in 2008 jointly by the Commonwealth and State Governments and the broadcast media to ".... develop and implement nationally consistent

arrangements for emergency warnings (and to provide) further information on the most effective choice of wording and phraseology to use when drafting warnings."

The document provides a set of guiding principles to be considered when writing an emergency message, suggests a structure and the language (words and phrases) to be used, and provides examples of warnings for non-English speaking audiences.

The evaluation will seek to establish whether and how these guidelines have been used in warnings issued via EA.

National Telephony Warning System Guidelines

National guidelines on the use of the EA system were issued by the EA Steering Committee in November 2009 following consultation between states and territories in two national workshops in July and October 2009. The guidelines provide ".... a framework, the principles and the legislative base for jurisdictions to develop compatible and consistent protocols to operationalize the system .... (and) .... to provide a consistent telephony-based warning methodology for emergency services in each state and territory that will: integrate the telephony warning system with current emergency management practices .... (and will) .... enable jurisdictions to align hazard specific warnings with the telephony warning system." (Section 2, Pages 5 and 6)

The guidelines include a number of conditions required for the EA system to be effective. (Section 5, Page 7) These include *inter alia*:

a. A high level of commitment from, and collaboration across, governments;

b. Appropriate community awareness and education programs are in place for EA systems;

c. The community is willing to act on the advice provided in the warnings;

d. Sound and timely intelligence is available to inform the decision-making process; and

e. The EA system should be just one of a number of media used to disseminate warnings.

The evaluation will assess how these national guidelines have informed the development of state guidelines. In particular, the evaluation will assess how the above assumptions are being applied at state level.

OESC EA Wave 1 research project

In November 2009 and February 2010, Quantum (a social and market research agency based in Melbourne) conducted research for OESC to determine in Victoria: (1) the level of awareness of EA; (2) the level of understanding of EA; (3) the level of preparedness for emergencies given the heightened awareness of the threat from bushfires; and (4) information gaps for the community and the best ways in which to provide such information. The research targeted urban, rural and regional communities, men and women, and different age groups. 620 people were interviewed in November 2009, prior to the national EA public information campaign; 650 people were interviewed in February 2010, following the information campaign.

The research concluded that the information campaign was successful with over three quarters of Victorians aware of EA, and with an increased understanding of the system. One of the key findings was that Victorians understand that EA does not replace the need for households and communities to be well prepared for bushfires and other threats.

OESC EA tests

In October 2010, test EA messages were sent to four areas in Victoria. The aim of the tests was to determine how an EA message is received, perceived and understood, and to determine what recipients planned to do as a result of receiving a message. Quantum interviewed 600 people by telephone in the four areas, and a further 150 people in Euroa who received a real flood alert.

The research concluded that the messages were clear and well understood regardless of delivery (landline or mobile). Of less clarity was the source and provider of the message, with many respondents simply associating it with "government". The research noted that the call to action was "somewhat less clear" particularly amongst those in Euroa threatened by a flood.

Quantum used a number of open questions. From the answers provided, and subsequent analysis by Quantum, it has been possible to develop a number of closed questions that will be used in the pilot EA evaluation in Victoria; see Part Five, research methodologies, community survey below.

National Strategy for Disaster Resilience

In 2010, a National Strategy for Disaster Resilience was developed by a working group on behalf of the National Emergency Management Committee (NEMC). COAG adopted the strategy on 13 February 2011 and declared its intention to implement it immediately, and to promote the development of several related strategies and programs.

The strategy states that ".... for Australia to become more resilient to disasters, we need a clearer understanding of our risks, and what to do about them. Information on disaster risk should be communicated in a manner that is appropriate to its audiences, and should consider the different needs, interests and technology used within communities." (Page 9)

The strategy notes that ".... while work is being progressed in relation to warning systems and new technologies for communicating timely messages when disaster strikes, more needs to be done so that communities receive and interpret information and take action." (Page 13)

The strategy provides general guidance rather than specific direction on the concept of disaster resilience. It is envisaged that subsequent State-level strategies will be more explicit in defining the contribution of EA and other tools to disaster resilience in Australia.

Key findings from literature review

The provision of clear, accurate and timely public information is an essential part of disaster preparedness. Governments have an obligation to educate society on future threats which may cause harm, loss or distress. People should be told when general threats become specific risks, and be advised on actions to reduce the likelihood and impact of potential harm. Individuals and communities need and expect to be warned of immediate danger – what is the threat, when will it happen, and how bad will it be. Public information and warnings should provide people with facts and advice, and enable individuals, communities and organisations to make informed decisions.

In practice, the provision of reliable, unambiguous and useful information is difficult to achieve. Often there is an absence of accurate data: the timing, location and severity of hazardous events are difficult to predict with certainty. People receive facts and advice from a number of sources in addition to formal public information: newspapers, 24 hour television news, the internet and mobile phones provide information which may be incomplete and sometimes contradictory. And people interpret and act upon warning messages differently - their perception of risk may be quite different from the actual likelihood and severity of harm.

EA warning messages must be seen as part of a broader program of public awareness and community education, and as such the evaluation of the EA system must consider the completeness and suitability of community education in each state. The information to be collected and analysed should therefore look beyond the technical performance of the EA system and whether the messages were consistent with best practice. The study should identify what people expect from community education, and indeed whether the education (or lack of it) provides people with a false understanding of what to expect from messages delivered by the EA system.

The time available for the procurement of the EA system (including the invitation to tender, the selection of Telstra, system testing and introduction at state level, including the preparation of local EA protocols and the training of operators) was extremely short. The study must recognise that procedures for the proper use of the EA system were still being developed as the system was being introduced, and some operators were 'learning on the job'.

The problems being faced in the US with their EAS and IPAWS show there is no 'silver bullet'. The study must recognise that the EA system is unlikely to meet all the needs and expectations of all the stakeholders.

ASSESSMENT OF THE EFFECTIVENESS OF EMERGENCY ALERT

The *National Telephony Warning System Guidelines* outline the legislation and principles for establishing a national emergency warning system, and provide guidance for jurisdictions to develop consistent protocols for using Emergency Alert (EA).

The guidelines describe seven inter-dependent elements which together aim to provide comprehensive warnings: (1) community preparedness; (2) situational awareness; (3) decision-making and authorisation; (4) message construction and dissemination; (5) management of warning consequences; (6) real-time monitoring; and (7) real-time closure.

As part of the evaluation of EA, operators are invited to 'score' all seven elements. This note provides guidance on the scoring system.

Using the guidance given in Pages 1 and 2, for each of the seven elements please allocate a score from 5 to 1, as follows:

Score 5: The current systems, processes and documented procedures are comprehensive, complete and understood by agencies. They have been applied in an operational setting and have proved to work well. There is an ongoing need to review the systems, processes and procedures.

Score 4: Systems, processes and documented procedures have been developed and are readily available. They have been applied in an operational setting, or practiced in field/desk exercises and are appropriate. There is scope for some further development / improvement.

Score 3: Systems, processes and documented procedures have been developed and are available. They have been applied in an operational setting, or practiced in field/desk exercises. There are no critical limitations, but there is a need for further development / improvement.

Score 2: Systems, processes and documented procedures are incomplete. There are critical limitations, and there is an urgent need for further development / improvement.

Score 1: The current systems, processes and documented procedures are completely inadequate.

Score 0: Unable to score due to inadequate knowledge.

Element	Score					
	5	4	3	2	1	0
(1) Community preparedness						
(2) Situational awareness and analysis						
(3) Decision making and authorisation						
(4) EA message construction and dissemination						
(5) Management of warning consequences						
(6) Real-time monitoring of emergency						
(7) Real-time closure of emergency						

REQUIREMENTS OF EFFECTIVE WARNING MESSAGES
Extracted from the National Telephony Warning System Guidelines

(1) Community preparedness

While the emergency services can provide information and warnings to communities at risk, the overall success of EA will be determined by the communities' ability to act on a warning. It is essential that communities understand their risk environment and know what to do on receiving an EA message. Educating communities to act in a timely and safe manner will reduce the loss of life, personal injury and damage to property and contribute to the effectiveness of EA.

(2) Situational awareness and analysis

Situational awareness involves an understanding of the dynamic relationship between a developing threat, the efforts of the emergency services and the community's exposure to risk. Providing the agencies with comprehensive, accurate and current information, and the tools to model how risks will develop over time, is an essential part of situational awareness. Better situational awareness will improve the quality of decisions and the content of EA warning messages.

(3) Decision-making and authorisation

The processes for making decisions on how and when to warn communities at risk should be included in protocols prepared by each jurisdiction. Protocols should explain the procedures to be followed in making decisions, and records should be maintained of all key decisions taken. The processes and procedures should be designed so as to enhance, and not impede, operational decision making and the subsequent dissemination of warning messages.

(4) Message construction and dissemination

EA warnings are intended to achieve two distinct outcomes: to inform the community of a current or impending threat, and to promote appropriate actions. Systems and procedures should be available and understood on how best to integrate EA messages with other media including radio, TV, official websites, social networking and RSS feeds. The aim is to provide people with sufficient information in a timely manner to enable them to make informed decisions.

(5) Management of warning consequences

In preparing and sending EA messages (together with other media) agencies should consider the likely community response to the messages, and the ability of other agencies to accommodate the outcomes, for example: updating information on agency websites, the activation of relief centres, and managing increased flows of traffic. Protocols and SOPs should explain how the consequences of a warning should be predicted, actioned and coordinated.

(6) Real-time monitoring of emergency

Agencies should monitor in real time the community's response to each EA warning message and information provided by other media. This information will assist the situational awareness of the emergency services, and help inform the detail and timing of follow-on EA messages and/or other media.

(7) Real-time closure of emergency

Individuals and households will expect to be told when they are no longer at risk. As a matter of course, agencies should inform the community using EA and/or other media.

HOUSEHOLD SURVEY QUESTIONNAIRE

Wednesday 1st June 2011 **Torrens Resilience Institute** **Job No: 11024**

Introduction

Hello, my name is ..... and I'm calling from Quantum Market Research, the Australian market research company, on behalf of the Office of the Emergency Services Commissioner.

I would like to ask you about the Emergency Alert warning message you may have received over the summer months on your landline telephone or mobile phone. It should take only 5 minutes to complete. Your answers will be confidential; we would like you to answer these questions but you don't have to. Are you the right person in the household to talk to about this?

Is now a convenient time or would it be more convenient if I make an appointment to speak to you at another time?

Continue 1
Make appointment 2
Refused 3

My supervisor may monitor this interview for quality control purposes. If you do not wish this to occur, please let me know.

Okay to monitor 1
Not okay to monitor 2

Q.1. Have you received an Emergency Alert voice message on your landline or a text message on your mobile phone at any time since November last year?

Yes ..... 1 **GO TO Q.2**
No ..... 2 **Continue**
Don't know ..... 3 **Continue**

Q.1.a Have you heard of the Emergency Alert warning system?

Yes 1
No 2
Don't know 3

Q.1.b How prepared are you to cope with an emergency caused by emergencies in your local area such as a flood, or a storm or a bushfire?

Very prepared 1
Quite prepared 2
Not very prepared 3
Not at all prepared 4
Don't know (Do Not Read Out) 5

Q.2. If you were to receive an Emergency Alert warning message on your landline telephone or text message on your mobile telephone, how likely are you to [INSERT EACH RESPONSE]...? Please answer using a scale from 5 to 1 where 5 means you would definitely do it and 1 means you would definitely not do it.

	Definitely not do	Unlikely	Neither	Likely	Definitely do	Don't know (DNRO)
Do nothing	1	2	3	4	5	6
Follow the instructions in the message	1	2	3	4	5	6
Contact family, friends or neighbours	1	2	3	4	5	6
Turn on the radio	1	2	3	4	5	6

Q.2.a If you wanted to find out more information about emergencies in your local area such as bushfires, floods or storms, where would you go? Do Not Read Out. Multiple Response

1800 number/by dialling a number/bushfire line 1
Federal Government website 2
State Government website 3
On the CFA website 4
On the SES website 5
On some other website 6
Radio/ABC radio/TV 7
Gave out a website but we don't have a computer/
don't have internet access 8
Got the message on my mobile/text message 9
SES website 10
Local news/community news/talk to local SES-CFA/
talk to neighbours/family/friends 11
The police 12
Local council 13

BOM 14
Don't know 15
Other (specify) 16

NOW TERMINATE IF CODE 2,3 ON Q.1

Q.3. Have many times have you received an Emergency Alert message? If you received a message on your home telephone and your mobile phone at the same time, please treat that as one message?

More than one message (please specify how many) 1
One message 2
I can't remember (**DO NOT READ OUT**) 3

Q.4. Did you receive the Emergency Alert message(s) as a...?

Direct call received on landline telephone 1
Voice message left on landline telephone answering machine 2
Text message received on mobile telephone 3
Other (please specify) 4
I can't remember (**DO NOT READ OUT**) 5

Q.5. Were the message(s) clear and easy to understand?

Yes ..... 1 **GO TO Q.6**
No ..... 2 **CONTINUE**

Only ask if code 2 on Q.5

Q.5.a Why was the message unclear?

Q.6. What time did you receive an Emergency Alert message? **DO NOT READ OUT – PROMPT FOR TIME OPEN-ENDED**

06:00am – 12:00pm	1	**SKIP TO Q.7**
12:00pm – 6:00pm	2	**SKIP TO Q.7**
6:00pm – 12:00am	3	**SKIP TO Q.7**
12:00am – 06:00am	4	**CONTINUE**
I can't remember (**DO NOT READ OUT**)	5	

Q.6.a Did the time of day affect your understanding of the message?

Q.7 Did you receive the whole message?

Yes	1	**GO TO Q.8**
No	2	**CONTINUE**
I can't remember **(DO NOT READ OUT)**	3	**GO TO Q.8**

Only ask if code 2 on Q.7

Q.7.a Why did you not receive the whole message?

The message terminated early	1
There was interference on the line	2
Another reason (please specify)	3

CHANGE TEXT OF THE FOLLOWING QUESTIONS BASED ON RESPONSE TO Q.4

If Code 1 only ask: What can you remember from the landline telephone message?

If Code 2 only ask: What can you remember from the direct call you received?

If Code 3 only, ask: What can you remember from the SMS message you received?

If multiple codes, ask: What of the below information can you remember from the Emergency Alert message you received?

Q.8 What was the first thing you heard at the very beginning of the message? **Do Not Read Out. Multiple Response**

Prepare to evacuate/prepare to leave	1
'Emergency, Emergency'/Emergency Warning	2
A warning/alert	3
Emergency services message	4
Fire warning	5
Instructions to listen to the radio	6
Siren/warning/beeping/alarm	7
A man's voice/automated voice	8
Flood warning	9
Don't know	10
Took no notice	11
Other (specify)	12

Q.8.a Do you know who issued the Emergency Alert message(s**)? Do Not Read Out. Multiple Response**

SES/Emergency Services	1
State Government/Victorian Government	2
Government/NFI Government Department	3
CFA/Fire Authorities	4
Telstra/Phone provider	5
Don't know	6
Took no notice	7
Other (specify)	8

Q.8.b What was the main threat or risk described in the Emergency Alert message(s)? **Do Not Read Out. Multiple Response**

Flood 1
Bushfire 2
Storm 3
Tsunami 4
Some other hazard 5
Other (specify) 6
Don't know 7

Q.8.c What did the Emergency Alert message tell you to do? If you received two or more messages, what did the final Emergency Alert message tell you to do? **Do Not Read Out. Multiple Response**

Take no action/no action required 1
Where to go for further information/website/contact details 2
Be prepared/get ready/put plan into action 3
Don't know 4
Took no notice 5
Other (specify) 6

Q.8.d After receiving the Emergency Alert message(s), did you… **Multiple response**

Sought further information from radio 1
Sought further information from TV 2
Sought further information from the Internet 3
Sought further information from elsewhere 4
Began to make a plan of action 5
Talked to your family/others in the household about the EA 6
Talked to your neighbours about the emergency alert 7
Reviewed your existing plan of action 8
Began to enact your emergency response plan 9
Contacted your local emergency services groups 10
Followed the instructions in the message 11
Did nothing 12
Something else (specify) 13

Q.9. Overall, would you say that the Emergency Alert message(s) you received…? **Read Out**

Exceeded your expectations	1	**GO TO Q.10**
Fully met your expectations	2	**GO TO Q.10**
Did not fully meet your expectations	3	**CONTINUE**
Unsure (**DO NOT READ OUT**)	4	
I can't remember (**DO NOT READ OUT**)	5	

Only ask if code 3 on Q.9

Q.9.a Why do you say that?

Q.10 How did you feel after receiving the Emergency Alert message(s)? **Do Not Read Out. Multiple Response**

Great/fantastic/appreciative/lives will be saved	1
Reassured that a system is in place/working	2
Glad that the SES/Government is doing something/good initiative	3
Panicked	4
Shocked	5
People should be kept informed/warned	6
Relieved that someone is looking out for me	7
I was already aware it was in place	8
Felt comfortable with it/wasn't worried	9
Made me more aware to be prepared	10
Didn't take much notice of it	11
Don't know	12
Other (specify)	13

ASK ALL

Q.11 How convenient is it for you receiving an Emergency Alert message via [INSERT POSSIBLE RESPONSES]...? By 'convenient' we mean how well it suits your needs in communicating a message to you. Please answer using a scale from 5 to 1 where 5 means you would find it very convenient and 1 means you would find it very inconvenient.

	Very inconvenient	Inconvenient	Neither	Convenient	Very convenient	Don't know (DNRO)
Voice message on your landline telephone	1	2	3	4	5	6
Text message on your mobile telephone	1	2	3	4	5	6

Q.12. In general, what do you believe are the main benefits and main disadvantages of sending warning messages by phone (including both mobile and landline)?

Q.13. If the electricity were to go out in your local area, would you still have access to a telephone (either a mobile phone or a landline telephone which does not require mains electricity)?

Yes 1
No 2

Q.14. Do you have any comments you would like to make about the Emergency Alert system?

And finally, just a couple more questions about you, so that we can understand how different people have answered these questions. As this is market research, it is carried out in compliance with the Privacy Act and the information you provided will be used only for research purposes.

Q.15. Which one of these age groups do you belong to?

18-24 years..... 1
25-34 years..... 2
35-44 years..... 3
45-54 years..... 4
55-64 years..... 5
65-74 years..... 6
75+ years..... 7

Q.16. What is the main language spoken at home?

English..... 1
Other (please specify)..... 2

Q.17 Do you or any member of your household have a disability that could make it difficult to access information on the landline or mobile telephone?

Yes..... 1
No..... 2

Q.18 Record Postcode

_____

Q.19. Record Gender

Male..... 1
Female..... 2

Q.20 Sometimes our interviews are checked to make sure we have done them correctly, could I have your first name only please?

_____

Terminate with thanks:

That's the end of the interview. As this is market research, it is carried out in compliance with the Privacy Act and the information you have provided will be used only for research purposes.

Thank you for your time. Just to remind you, I'm calling from Quantum Market Research. If you have any queries, you can call our switchboard during normal business 03 9289 9599, or you can call the Australian Market and Social Research Society's free survey line on 1300 364 830.

NAME: ----------

ADDRESS: ----------

SUBURB: ----------

POSTCODE: ----------

PHONE: ----------

I declare that the information obtained is true and correct and I have obeyed the ICC/ESOMAR Code of Marketing and Social Research Practice.

INTERVIEWER: ----------

Start	Finish	Min

AREAS SURVEYED

Boggabilla, NSW

Boggabilla, with a population of around 650, is a small town in the far north inland region of New South Wales in the Moree Plains Shire. Its economy is based on agriculture and tourism.

On 12 January 2011, Boggabilla and neighbouring towns were hit by massive floods due to rising water levels in the McIntyre and Clarence Rivers. These floods were a direct result of the massive flooding in Queensland, whose river systems are upstream of New South Wales' rivers and were draining massive amounts of flood water into New South Wales.

EA messages warning people in the Boggabilla area were sent to xxx fixed and xxx mobile phones at 2315 hours on 12 January, warning people evacuate immediately. They were told to assemble at the Boggabilla Town and Country Club so that buses could take them to Moree, where they were to be given temporary accommodation: this is the group interviewed in the household survey.

20 people from the Boggabilla area were interviewed.

Cabbage Tree (Moreton Bay), QLD

Cabbage Tree Point, with a population of 498 is located at the southern edge of Moreton Bay, on the north eastern corner of the Gold Coast.

On 27 February 2010 an earthquake struck off the coast of Chile. A tsunami was expected to produce dangerous waves, strong currents and foreshore flooding along the southeast Queensland coast. ABC News advised people not to go to the beaches until the threat had passed.

EA messages warning people in the Cabbage Tree area were sent to xxx fixed and xxx mobile phones on 28 February at 0845 hours to expect minor inundation in low lying areas and advised them to monitor local conditions, watch local roads and to be ready to protect themselves and their property from water: this is the group interviewed in the household survey.

19 people from the Cabbage Tree area were interviewed.

Charlton, VIC

Charlton, with a population of around 1,100 is located in the Shire of Buloke, some 245km north west of Melbourne. Its economy is based primarily on agriculture, olive farms, a winery, a quarry and related services.

Throughout Charlton's history, the Avoca River has been known for its spontaneous flooding after heavy rain, spilling over land around the town, and occasionally parts of Charlton. Levee banks were constructed to their present levels in the 1950s. The town and surrounding area were affected by the floods of September and November 2010, but the flash floods in January 2011 caused much greater damage and led to the evacuation of more than 400 properties. The Avoca River peaked at 8.05m on Saturday 15 January.

EA messages warning people in the Charlton area of potential flooding were sent on 28 November 2010. Messages to *'prepare to evacuate'* were sent to 764 fixed and 1,204 mobile phones on 13 January 2011 at 1539 hours: this is the group interviewed in the household survey. Messages to *'evacuate immediately'* were sent the following day.

105 people from the Charlton area were interviewed.

Creswick, VIC

Creswick, with a population of around 2,485 is located in the Shire of Hepburn, some 130km north west of Melbourne. It was formerly a gold mining town, with a population in excess of 25,000. Its economy is now based primarily on agriculture, forestry, a small industrial park and the University of Melbourne's School of Forestry and Ecosystem Science.

The town and surrounding area were affected by the floods of September 2010, but the flash floods in 14 January and 4 February 2011 caused greater damage. The events were centred along the Creswick Creek, impacting homes and businesses in Creswick and Clunes. A number of properties in and around other townships were inundated from low overlaying flows after heavy rains.

EA messages warning people in the Creswick area to *'prepare to evacuate'* were sent to 1,275 fixed and 1,129 mobile phones on 4 February at 2127 hours: this is the group interviewed in the household survey.

65 people from the Creswick area were interviewed.

Currumbin, QLD

Currumbin, with a population of around 2,647 is a suburb of the Gold Coast, Queensland. Its economy centres on tourism, particularly in relation to nearby beaches.

On 27 February 2010 an earthquake struck off the coast of Chile. A tsunami was expected to produce dangerous waves, strong currents and foreshore flooding along the southeast Queensland coast. ABC News advised people not to go to the beaches until the threat had passed.

EA messages warning people in the Currumbin area were sent to xxx fixed and xxx mobile phones on 28 February at 0921 hours to expect minor inundation in low lying areas and advised them to monitor local conditions, watch local roads and to be ready to protect themselves and their property from water: this is the group interviewed in the household survey.

6 people from the Currumbin area were interviewed.

Darwin River and Tumbling Wells, NT

Tumbling Wells is a small town close to the Darwin River and its dam. It has a population of about 430 and its economy centres around fruit and tree nut growing.

On 17 February 2011, excessive rains from Tropical Cyclone Carlos caused the Darwin River Dam to exceed its capacity. Incidents of local flooding and inundation were recorded on portions of the Darwin River Road, Reedbeds Road, Old Bynoe Road, and Cox Peninsula Road. These roads are all in the vicinity of the town of Tumbling Wells.

EA messages warning people living in the area were sent to 488 fixed and 669 mobile phones on 17 February at 0330 hours: this is the group interviewed in the household survey.

24 people from the Tumbling Wells and Southport areas were interviewed.

Horsham, VIC

Horsham, with a population of around 14,125 is located in the Wimmera region, some 300km north west of Melbourne. The city is at the junction of the Henty, Western and Wimmera highways. Horsham is the main regional provider of retail, community and

government services. Its economy is based on agriculture and related work, tourism, and local and regional services. The Victorian Institute for Dryland Agriculture and a campus of the University of Ballarat are based in Horsham.

The town and low lying areas were affected by the floods of January 2011 when the Wimmera River overflowed causing damage to homes and businesses, and the flooding of agricultural and recreational land.

EA messages warning people in the Horsham area to *'prepare to evacuate'* were sent on 17 January. Messages to people in two smaller groups within the Horsham area advising them to *'evacuate immediately'* were sent early the following day. Messages to a third group comprising 697 fixed and 1,009 mobile phones were sent on 18 January at 0506 hours: this is the group interviewed in the household survey.

100 people from the Horsham area were interviewed.

Kerang, VIC

Kerang, with a population of around 3,780 is located in the Shire of Gannawarra in the District of Swann Hill, some 280km north west of Melbourne and 25km from the state border with NSW. Its economy is based primarily on agriculture and tourism.

The town and surrounding areas were affected by the floods of January 2011 causing significant damage, despite the construction of local levees. The Loddon River peaked at 1pm on Wednesday 19 January, but remained high for many days.

EA messages warning people in the Kerang area to *'prepare to evacuate'* were sent to 3,503 fixed and 4,375 mobile phones on 16 January at 1909 hours: this is the group interviewed in the household survey. Messages to *'evacuate immediately'* were sent to homes and other properties considered most at risk on 18 January, and to others the following day.

110 people from the Kerang area were interviewed.

Koo Wee Rup, VIC

Koo Wee Rup, with a population of around 2,900 is located in the Shire of Cardinia, some 63km south east of Melbourne's CBD. The town is built on former marshland, now converted to market gardens. Koo Wee Rup is Australia's largest asparagus growing district. It is also a beef farming and potato growing area.

The Shire of Cardinia, including the area around Koo Wee Rup, has a history of flooding characterised by large expanses of slow moving water. Due to the extremely flat terrain, even minor flooding routinely inundates agricultural areas**.** Continuous rain in southern Victoria in early February 2011 caused the Bunyip River to reach its highest level in 40 years. On Friday 5 February, paramedics moved 50 patients from the Koo Wee Rup Hospital to Melbourne as a precautionary measure.

EA messages warning people of flash flooding in the Koo Wee Rup area were sent to 3,928 fixed and 1,923 mobile phones on 5 February at 2001 hours: this is the group interviewed in the household survey. Messages warning of road closures were sent the same day at 2320 hours.

110 people from the Koo Wee Rup area were interviewed.

Light River region, SA

The Light River begins just below the township of Waterloo, South Australia, and winds its way for 164km to the Southern Ocean. Its starting point is about 100km north of Adelaide,

and its curving path takes it through the larger towns of Kapunda, Mallala and Hamley Bridge. This area of South Australia is relatively flat and rolling. The local economy is built around cereal and wheat farming, particularly at Kapunda and Mallala, and land is used primarily for this type of agriculture and its associated activities.

On 8 December 2010, at 1000 hours, the South Australian Sate Emergency Services (SA SES) sent out the first EA messages to the residents of Two Wells, on the Light River floodplain. Heavy overnight rainfall caused the Light River to overflow its banks, threatening homes and residents in the area. By 1420 hours, another warning message was issued for residents near the Light, Wakefield and Gawler Rivers. People were advised to take all necessary precautions to ensure their safety and to consider relocating. At 1700 hours, another warning message was issued, telling people to remain vigilant as the rivers were still expected to peak around midnight. A similar warning message was issued at 2130 hours.

EA messages warning people living in the area of were sent to 3,982 fixed and 7,919 mobile phones on 8 December at 1315 hours: this is the group interviewed in the household survey.

256 people from the Light River area were interviewed.

Mareeba, QLD

Mareeba, with a population of 8,000 is situated in the Atherton Tableland region of Queensland, on the confluence of the Barron River and the Granite and Emerald Creeks. Its economy is based on horticulture, poultry and cattle. Lately, tourism has become a major contributor to Mareeba's economy.

On 6 and 7 March 2011, heavy rainfall raised water levels in the Barron River catchment, resulting in a major flood emergency. On 6 March, the Barron River at Mareeba rose by 3.91m at 1026 hours and 4.38m at 1100 hours.

EA messages warning people in the Mareeba area were sent to xxx fixed and xxx mobile phones on 7 March at 1247 hours advising residents to consider evacuating to higher ground, to monitor river levels and to start planning evasive actions. It also directed them to listen to local radio for further information: this is the group interviewed in the household survey.

255 people from the Mareeba area were interviewed.

Rochester, VIC

Rochester, with a population of around 1,850 is located in the Shire of Campaspe, some 180km north of Melbourne, with a mixture of rural and semi-rural communities on the northern Campaspe River between Bendigo and the Murray River port of Echuca. Its economy is based primarily on agriculture, related industries and local services.

Rochester suffered the greatest flood in the town's history in January 2011. Around 80% of the town was inundated with water from the Campaspe River, which reached a peak of 9.17m. Many of the town's residents were evacuated to Echuca, 30km to the north, and the Australian Defence Force was called in to help evacuate Rochester's hospital. The floods were caused by an exceptional amount of rain falling into the Campaspe catchment at Lake Eppalock during the previous week. Water coursed down Eppalock's spillways directly into the Campaspe.

EA messages warning people in the Rochester area of potential flooding were sent on 28 and 30 November 2010. Messages to *'evacuate immediately'* were sent to 2,493 fixed and 3,204 mobile phones on 15 January at 0903 hours: this is the group interviewed in the household survey. A further message, advising people to attend a community meeting was sent on 5 February.

110 people from the Rochester area were interviewed.

Roma, QLD

Roma is a town in Queensland's Darling Downs region. It is 355km from Brisbane and is in the Maranoa electoral district. It is rich pastoral and wheat growing country and has extensive natural gas and oil reserves.

Roma has seen severe flooding in previous years, particularly from Bungil Creek and the Comet, Dawson and Balonne Rivers. The Bureau of Meteorology recorded a major flood event in March 1997 as a result of heavy rains in the Bungil Creek catchment area. In December 2010, Bungil Creek rose to nearly 7m, leading to flooding in Roma. More recent flooding on 19 and 20 April 2011 inundated 280 homes. By midday on 19 April, Bungil Creek rose to 7.3m. It was expected to reach a record 8.1m between 1700 and 1900 hours.

EA messages warning Roma's residents living in low-lying areas near Bungil Creek to take action or evacuate to higher ground were sent to xxx fixed and xxx mobile phones on 19 April at 0654 hours: this is the group interviewed in the household survey.

255 people from the Roma area were interviewed.

Ulmarra, NSW

Ulmarra, with a population of around 500, is a small town on the south bank of the Clarence River in New South Wales. It is part of the Clarence Valley Shire Council and is approximately 14km from the town of Grafton. Ulmarra is noted for its vehicular river ferry that regularly provides crossing services across the Clarence River.

On 15 January 2011, a minor flood warning was issued for Ulmarra and several other towns and settlements along the Clarence River. This was due to heavy rains, which raised river levels at Ulmarra by 2.77m by 0900 hours on the morning of 15 January.

EA messages warning people living in the areas of Ulmarra, Grafton and Maclean were sent to xx fixed and xxx mobile phones on 15 January 2011 at 0934 hours: this is the group interviewed in the household survey.

34 people from the Ulmarra area were interviewed.

Wakefield River region, SA

The Wakefield River begins just below the township of Mintaro, South Australia, and winds its way through the towns of Auburn, Balaklava, Whitwarta, Bowmans and Port Wakefield. This area of South Australia is relatively flat and rolling.

On 6 December 2010, at 1000 hours, the South Australian Sate Emergency Services (SA SES) advised that severe weather was forecast for many parts of South Australia over the following 36 hours.

EA messages warning people living in the Wakefield River area were sent to 619 fixed and 977 mobile phones on 8 December at 1342 hours: this is the group interviewed in the household survey.

31 people from the Wakefield River area were interviewed.

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NOTES

1. It was not technically possible to incorporate a location based capability and have the existing system operational for 1 December 2009. The capability to send warnings to mobile phones based on the location of the handset has now been funded by the Federal Government. Victoria will lead the negotiations with each of the three mobile carriers on behalf of all States and Territories; reference www.emergencyalert.gov.au as at 28 March 2011.

2. *The National Strategy for Disaster Resilience*, which was adopted by COAG on 13 February 2011, lists the governments' responsibilities as:

   a. developing and implementing effective, risk-based land management and planning arrangements and other mitigation activities;

   b. having effective arrangements in place to inform people about how to assess risks and reduce their exposure and vulnerability to hazards;

   c. having clear and effective education systems so people understand what options are available and what the best course of action is in responding to a hazard as it approaches;

   d. supporting individuals and communities to prepare for extreme events;

   e. ensuring an effective, well-coordinated response from the emergency services and volunteers when disaster hits; and

   f. working in a swift, compassionate and pragmatic way to help communities recover from devastation and to learn, innovate and adapt in the aftermath of disastrous events.

3. In November 2009 and February 2010, Quantum (a social and market research agency based in Melbourne) conducted research for OESC to determine in Victoria: (1) the level of awareness of EA; (2) the level of understanding of EA; (3) the level of preparedness for emergencies given the heightened awareness of the threat from bushfires; and (4) information gaps for the community and the best ways in which to provide such information. The research targeted regional and urban communities, men and women, and different age groups. 620 people were interviewed in November 2009, prior to the national EA public information campaign; 650 people were interviewed in February 2010, following the information campaign.

   The research concluded that regional Victorians are more likely to perceive themselves to be at risk of disruptive events (70% c.f. 57%); that regional Victorians are more aware of EA (82% c.f. 72%); and that regional respondents are more likely to activate their plans / get prepared (15% c.f. 10%)

4. The Common Alerting Protocol (CAP) is a simple - but general - format for exchanging all-hazard emergency alerts and public warnings over various kinds of networks. CAP allows a consistent warning message to be disseminated simultaneously over many different emergency warning systems, increasing warning effectiveness while simplifying the warning process. CAP provides a template for effective warning messages based on best practices identified through academic research and real-world experience.

   The Attorney-General's Department on behalf of the CAP Working Group Common Alerting Protocol – Stage II / Feasibility Study has funded a project which aims to: (1) enhance the EA capabilities; (2) address recommendation 4.1 'incorporate the use of the Common Alerting Protocol, as adapted for the Australian context' from the Victorian Bushfires Royal Commission interim report; and (3) support the underlying principles of the Australian Government's Information Interoperability Framework and the National Information Sharing Strategy.